



Penn E&R

Environmental & Remediation, Inc.

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October 10, 2001
4013-20000

VIA OVERNIGHT EXPRESS MAIL

Mr. Joseph McDowell (3HS21)
Remedial Project Manager
U.S. Environmental Protection Agency
Region III
1650 Arch Street
Philadelphia, PA 19103

Subject: Final Revised Remedial Design/Remedial Action Work Plan for the Cinder/Slag Fill Area Located on Liberty Property Trust's 2301 Renaissance Boulevard Property

Dear Mr. McDowell:

Enclosed with this letter are three copies of the portions of the Remedial Design/Remedial Action Work Plan (RD/RAWP) for the Cinder/Slag Fill Area (CSFA) that were revised in response to your September 12, 2001 letter and our subsequent response letters dated September 14 and October 1, 2001. The Sections of the work plan that were revised and which are included with this letter include the following:

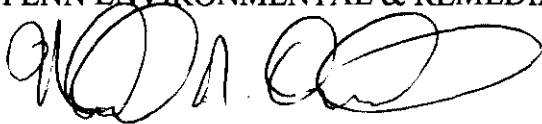
- Cover Page
- Table of Contents
- Section 2.0 and Tables 2-1A and 2-2
- Section 4.0
- Attachment 4B and Figure 4B-1
- Section 5.0 and Table 5-1
- Section 6.0, Tables 6-1A and 6-2, and Attachment 6E.

Please replace the relevant sections of the July 11 submittal with these revised sections.

Mr. Joseph McDowell
October 10, 2001
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Should you have any questions regarding the contents of this letter or any revisions that were made to the RD/RAWP for the CSFA, or if you require additional information, please do not hesitate to call me.

Sincerely,
PENN ENVIRONMENTAL & REMEDIATION, INC.

A handwritten signature in black ink, appearing to read 'Michael A. Christie', written over a horizontal line.

Michael A. Christie, P.G.
Vice President

MAC:dlc
Enclosure
4013:csfa1051

cc: Dave Minsker, PADEP (w/2 copies of the enclosure)
Andrew Frebowitz, Tetra Tech NUS (w/2 copies of the enclosure)
Ronald Wagenmann, Upper Merion Township (w/enclosure)
Joseph Bartlett, Upper Merion Environmental Advisory Council (w/enclosure)
Jim Shelton, Malcom Pirnie (w/enclosure)
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Thomas Legel, P.E., Advanced GeoServices Corporation (w/enclosure)
Bruce Hartlein, Liberty (w/enclosure)
Brenda Gotanda, Esq., Manko, Gold & Katcher (w/enclosure)
Darryl Borrelli, Manko, Gold & Katcher (w/enclosure)

**REMEDIAL DESIGN/REMEDIAL ACTION
WORK PLAN FOR THE CINDER/SLAG FILL AREA LOCATED AT
2301 RENAISSANCE BOULEVARD
IN UPPER MERION TOWNSHIP, MONTGOMERY COUNTY, PA**

Prepared For:

United States Environmental Protection Agency

and

Pennsylvania Department of Environmental Protection

Prepared By:

Penn Environmental & Remediation, Inc.

2755 Bergey Road
Hatfield, PA 19440

On behalf of:

Liberty Property Limited Partnership

and

Liberty Property Trust

65 Valley Stream Parkway
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Malvern, PA 19355

July 11, 2001

August 27, 2001 (Revised)

October 10, 2001 (Final)

4013-01000



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2.0 SITE CHARACTERIZATION ACTIVITIES

This Section of the RD/RAWP provides a discussion of the site characterization activities that have been completed in the cinder/slag fill area (CSFA), and the results of these activities.

2.1 Previous Site Characterization Activities

As part of LPT's 1998 due diligence survey, an area of fill material was identified in the north-central portion of their 2301 Renaissance Boulevard property. The location of this fill area, which has since been designated the cinder/slag fill area (CSFA), is shown on Figure 2-1. As part of the investigation of the material in the CSFA, nine test trenches were installed into this area at the approximate locations shown on Figure 2-2. These test trenches were designated FT-1 through FT-5, FT-8, FT-9, FT-12 and FT-14 and each was excavated until native soil was encountered. During the installation of these test trenches, the excavated materials were visually inspected and screened with a photoionization detector (PID) for the presence of volatile organic vapors. A description of the materials encountered in each of these test trenches as well as a summary of the field screening results is included in Attachment 2A.

Based on information obtained from the test trenches and the additional site characterization activities completed in this area in May 2001, as discussed below in Section 2.2, the material in the CSFA consists primarily of glass, ash, coal dust, cinders, and slag. As shown on Figure 2-1, the surface expression of the CSFA encompasses an area, on average, about 240 feet long by 125 feet wide. The thickness of the fill ranges from 1-foot along the perimeter of the area to up to 12 feet in the central portion of the CSFA. However, the fill material is, on average, from 3 to 4 feet thick. There is approximately 4,000 cubic yards of fill located in this area. The source of the fill is not known, however, based on historical aerial photographs, it was placed in this area prior to 1959.

To evaluate the chemical makeup of the fill material, Penn E&R collected a grab soil sample from test trench FT-3 in February 1998. This sample, which was designated FT-3, was collected at a depth of 10.5 feet below the ground surface (BGS) from material that appeared to be most representative of the fill and from an area where elevated PID readings were detected. The sample was analyzed for the Target Compound List (TCL) volatile and semivolatile organic compounds and the Target Analyte List (TAL) inorganics (i.e., metals and cyanide). The results of the analysis of this sample are summarized in Tables 2-1 and 2-1A, and a copy of the laboratory analytical data sheets for this sample is included in Appendix 2B.

In evaluating the sample results, the data were compared to Act 2 non-residential direct contact and soil-to-groundwater Medium Specific Concentrations (see Table 2-1) developed pursuant to Pennsylvania's Land Recycling and Environmental Remediation Standards Act (Act 2) and USEPA Region III generic risk-based concentrations and soil screening levels (see Table 2-1A). In selecting USEPA soil screening levels, a Dilution Attenuation Factor (DAF-20) was used. This DAF was selected because the depth to ground water beneath the CSFA is from 75 to 80 feet below the ground surface and, upon completion of the remedial activities, the source area will have been removed. Also, the non-carcinogenic compounds were compared to one-tenth of their USEPA Region III generic risk based concentrations and soil screening levels.

A review Tables 2-1 and 2-1A shows that no volatile or semivolatile organic compounds were detected above Act 2 Medium Specific Concentrations (MSCs) or generic USEPA Risk Based Concentration (RBCs) or Soil Screening Levels (SSLs) in sample FT-3. With the exception of arsenic and lead, no metals were detected above Act 2 non-residential soil-to-groundwater MSCs or USEPA generic SSLs in sample FT-3. The metals antimony, arsenic, barium, cadmium, chromium, iron, lead, manganese, thallium, and zinc were detected above either their USEPA RBC or SSL in sample FT-3.

To characterize the fill material in the CFSA for disposal purposes, Penn E&R also collected one representative composite sample (sample FAA-5C/5G) of the fill material on March 24, 1998. This sample was collected by first dividing the CSFA into four quadrants (Quadrants FAA-1 through FAA-4 as shown on Figure 2-3). Two sample aliquots from each quadrant were then collected at various depths. The individual sample aliquots were then thoroughly homogenized in a decontaminated stainless steel mixing bowl. A composite sample from the mixing bowl was then collected and placed directly into laboratory supplied sample bottles. This sample was designated FAA-5C/5G and was analyzed for the PADEP Form U Table A parameters. The volatile fraction of this sample (FAA-5C) was collected as a grab from the aliquot that displayed the highest volatile organic reading based on screening with a photoionization detector. Penn E&R also collected one individual composite sample from each of the four quadrants on March 24, 1998. These samples were designated FAA-1 through FAA-4 (see Figure 2-3) and each consisted of a composite of five individual aliquots collected from various depths from its corresponding quadrant. As an example, sample FAA-1 consisted of a composite of the five aliquots collected from quadrant FAA-1 and sample FAA-2 consisted of a composite of the five aliquots collected from quadrant FAA-2. As lead was identified as the only contaminant of concern for potential leachability, these samples were analyzed for TCLP lead.

The results of the analysis of sample FAA-5C/5G and samples FAA-1 through FAA-4 are included in Attachment 2C. A review of Attachment 2C indicates that none of the PADEP Form U Table A parameters were detected above any EPA regulatory levels in sample FAA-5C/5G and TCLP lead was not detected above its EPA regulatory level in samples FAA-1 through FAA-4.

Two additional composite samples were collected from the CFSA by Penn E&R on October 7, 1999. These samples were collected by first dividing the CSFA into two sections (Sections FAC-10 and FAC-11 as shown on Figure 2-4). Four sample aliquots from various depths were then collected from each section. The four individual sample aliquots representing one of the sections were then thoroughly homogenized in a decontaminated stainless steel mixing bowl. A composite sample representative of the two sections was collected in this manner. These two samples were designated FAC-10 and FAC-11 and were analyzed for the TCLP metals, PCBs and total petroleum hydrocarbons (TPHs). A copy of the results of the analysis of these samples is included in Attachment 2C. A review of these results indicates that none of the TCLP metals were detected above their EPA regulatory levels in the two samples. Also, no PCBs were detected above laboratory detection limits in the two samples and each sample displayed a TPH level of less than 210 mg/kg.

Based on the results of the aforementioned characterization sampling, the fill material in the cinder/slag fill area was determined not to be characteristically hazardous. Therefore, a PADEP Form U (Request to Process or Dispose of Residual Waste) and addendum were completed and submitted to Waste Management of Pennsylvania and the PADEP for review and approval on November 1 (original) and November 20, 2000 (addendum). A copy of the completed Form U is provided in Attachment 2D. Based on their review, Waste Management/PADEP approved the disposal of up to 5,250 tons of material from the CSFA at Waste Management's Pottstown, PA Landfill. A copy of Waste Management's approval letter is also provided in Attachment 2D.

2.2 Remedial Design Site Characterization Activities

On April 25, 2001, LPT met with representatives of the USEPA and PADEP to discuss the preliminary remedial design for the CSFA. (LPT originally anticipated capping the area but has now elected to excavate the material in the CSFA for off-site disposal.) Based on the results of this meeting, both the USEPA and PADEP requested to see additional characterization of the CSFA prior to the design of the remedial action. A work plan entitled "Proposed Site Characterization Activities for the Cinder/Slag Fill Area Located on LPT's Yellow Parcel" was submitted to the USEPA/PADEP on April 26, 2001. The USEPA/PADEP provided their comments on the review of the aforementioned work plan in a letter dated April 30, 2001. Penn E&R addressed the review comments provided by the USEPA/PADEP in a work plan addendum dated May 2, 2001. A copy of the April 26, 2001 Work Plan, the USEPA's/PADEP's April 30, 2001 comment letter, and the May 2, 2001 addendum Work Plan is included in Attachment 2E.

The site characterization activities performed in the CSFA as part of the implementation of the approved Work Plan, and the results of these activities are discussed below.

Confirmation of the Horizontal and Vertical Limits of the Cinder/Slag Fill Area

Penn E&R mobilized a Geoprobe® drill rig to the CFSA on May 4 and 7, 2001. The drill rig was used to install a series of thirty-five soil borings around and through the CSFA. These borings were designated CFSA-1 through CFSA-8 and 8A, CFSA-9, CFSA-10 and 10A, and CFSA-11 through CFSA-33. The locations at which these borings were installed are shown on Figure 2-5.

Each boring was advanced to native soil. Soils samples were collected continuously from each boring using a 4-foot long macrocore sampler. The soil samples were visually inspected for evidence of fill and other signs of contamination and screened with a photoionization detector (PID) for volatile organic vapors. All field observations and screenings were logged in a field book.

A series of soil borings were initially installed around the perimeter of the CSFA to confirm the horizontal boundaries and define the contents of the area. The borings installed to define the perimeters of the CSFA were designated CFSA-1 through CFSA-8 and 8A, CFSA-9, CFSA-10 and 10A, CFSA-11 through CFSA-14, CFSA-28 and CFSA-29. These borings were spaced at approximately 50-foot intervals around the perimeter of the CSFA. The soil samples collected from these initial perimeter borings were visually inspected for evidence of fill. If fill was encountered, another boring was installed five feet further out from the boring in which fill was

visually observed. This process was continued until the limits of the cinder/slag fill area had been delineated. The remaining borings, designated CSFA-15 through CSFA-27 and CSFA-30 through CSFA-33 on Figure 2-5, were installed within the defined limits of the area and were used to evaluate the vertical extent and define the contents of the interior portions of the CSFA. A boring log for each of the borings installed in the CSFA is provided in Attachment 2F.

A review of Attachment 2F shows that the contents of the CSFA consist primarily of cinder, slag, ash, coal dust, and glass. No elevated volatile organic vapors were detected in any of the borings. With the exception of a coal-tar odor at a depth of 4 feet in boring CSFA-20, no olfactory evidence of contamination was noted in the borings.

After the borings had been installed, the limits of the CSFA were surveyed and the horizontal and vertical location of each boring installed were determined. The results of the survey were used to locate the CSFA as shown on Figure 2-1. As shown on Figure 2-1, the surface expression of the CSFA encompasses an area approximately 240 feet long by 125 feet wide. Information obtained from the borings indicates that the thickness of the fill ranges from 1-foot around the perimeter of the area to up to 12-feet in the central portion of the CSFA. However, on average, the fill material is 3 to 4 feet thick. There is about 4,000 cubic yards of fill material located within the CSFA. Figure 2-6 shows the thickness of fill material encountered in the borings installed in the CSFA.

Upon completion, each boring was backfilled with any remaining cuttings. Prior to leaving the CSFA, the drill rig was properly decontaminated. The limited quantity of wash water that was generated during this process was allowed to drain from the decon pad back onto the CSFA.

The soil boring installation and sampling activities were implemented and overseen by OSHA trained Penn E&R personnel. Also, a representative of the USEPA or one of the Agency's oversight contractors, Tetra Tech NUS, Inc. and/or Dynamac, were on-site throughout the site characterization activities. Additionally, during the on-site characterization activities, air monitoring for total dust and lead was completed. Personal air monitors were placed on the Penn E&R on-site representative and the driller on both days of the soil investigation. Neither total dust nor lead were detected close to their respective OSHA Action Levels/PELs in the four personal air samples collected during the site characterization activities. A copy of the air monitoring results is included in Attachment 2G.

Collection of Representative Samples from the Cinder/Slag Fill

To supplement the existing chemical analytical data that exists for the CSFA, the Remedial Design Site Characterization included the collection and analysis of six additional samples from the area. The samples selected for analysis were obtained from borings CSFA-22 from a depth of 2 to 4 feet BGS, CSFA-23 from 4 to 8 feet BGS, CSFA-24 from 3 to 4 feet BGS, CSFA-25 from 0 to 4 feet BGS, CSFA-26 from 3 to 6 feet BGS, and CSFA-27 from 3 to 4 feet BGS. For quality assurance/quality control purposes, a duplicate sample, designated CSFA-40, was collected from boring CSFA-23. Also, a field blank and a trip blank were collected.

As no elevated PID readings were obtained, the samples submitted for analysis were selected to ensure a representative evaluation of the contents of the CSFA. The samples selected for analysis were approved by the USEPA and/or its oversight contractor. The volatile organic fraction of each sample was collected directly from the macrocore sampler using an Encore™ sampler. The remaining soils from the selected sample interval were then placed in a decontaminated stainless steel mixing bowl. The material was then thoroughly homogenized using decontaminated stainless steel spoons. The remaining laboratory supplied sample bottles were then filled.

The six samples, the duplicate (CSFA-40), and the field blank were analyzed for the TCL volatile and semivolatile organic compounds using USEPA Method OLM04.2 and for the TAL inorganics (i.e., metals and cyanide) using USEPA Method ILM04.2. The trip blank was analyzed for the TCL volatile organics only. The samples were analyzed by CompuChem, an EPA approved CLP laboratory located in Cary, NC. The results of the analysis of the six samples and the duplicate are summarized in Tables 2-1 and 2-1A, and a copy of the laboratory data sheets for these samples are provided in Attachment 2H. The results were compared to Act 2 non-residential MSCs (see Table 2-1) and USEPA Region III generic RBCs and SSLs (see Table 2-1A). The non-carcinogenic compounds were compared to one-tenth of their USEPA generic RBCs and SSLs.

A review of Table 2-1 shows that no volatile organic compounds were detected above their Act 2 MSCs. Also, with the exception of benzo(a)pyrene in sample CSFA-27, no semivolatile organic compounds were detected above their Act 2 MSCs in the six samples. Benzo(a)pyrene was detected at a concentration of 12 mg/kg in sample CSFA-27, which just exceeds its direct contact MSC for surface soils of 11 mg/kg. The metal lead was detected above both its direct contact MSC for surface soils and soil-to-ground water MSC of 1,000 mg/kg and 450 mg/kg, respectively, in samples CSFA-22, CSFA-23, CSFA-25, CSFA-27 and duplicate sample CSFA-40. Lead was detected above its soil-to-ground water MSC but not its direct contact MSC in samples CSFA-24 and CSFA-26. Also, thallium was detected just above its soil-to-ground water MSC of 14 mg/kg in samples CSFA-22 (17.3 mg/kg), CSFA-24 (25.8 mg/kg), and CSFA-25 (16.7 mg/kg). No other metals were detected above their Act 2 MSCs in the six samples collected from the CSFA.

A review of Table 2-1A shows that the volatile organic compound benzene was detected above its very restrictive USEPA SSL of 0.002 mg/kg in samples CSFA-22, CSFA-23, CSFA-25, and CSFA-26. No other volatile organic compounds were detected above their USEPA RBCs or SSLs. No semivolatile organic compounds were detected above their USEPA RBCs/SSLs in samples CSFA-25 and CSFA-26, and only benzo(a) pyrene was detected above its USEPA RBC/SSL in sample CSFA-24. Samples CSFA-22, CSFA-23 (and duplicate sample CSFA-40), and CSFA-27 exhibited a few semivolatile organic compounds above either their USEPA RBC or SSL. With the exception of benzo(a)pyrene in sample CSFA-27, none of these semivolatile organic compounds were detected above Act 2 MSCs. Also, several metals were detected above both their USEPA RBC and SSL.

As indicated earlier, CSFA-40 was a duplicate sample of CSFA-23. As shown in Table 2-1, sample CSFA-23 exhibited a lead concentration of 1,490 mg/kg. However, duplicate sample

CSFA-40 exhibited lead at a concentration of 25,000 mg/kg. Based on this wide disparity between the lead concentration for the environmental sample (CSFA-23) and the associated duplicate sample (CSFA-40), Penn E&R requested that the laboratory reanalyze sample CSFA-40 for lead. This reanalysis of sample CSFA-40 revealed lead to be present at a concentration of 1,010 mg/kg, which is similar to the lead concentration detected in the environmental sample, sample CSFA-23, from which duplicate sample CSFA-40 was collected and the lead concentration for the other five samples collected from the CSFA.

The relatively similar lead concentrations in sample CSFA-23 (1,490 mg/kg) and the reanalysis of duplicate CSFA-40 (1,010 mg/kg) suggest that these results are more indicative of the lead concentration of the material in this portion of the cinder/slag fill area. The elevated lead concentration detected in the original analysis of duplicate sample CSFA-40 likely was biased high as the result of the presence of a small quantity of material with an anomalously high concentration of lead (i.e. piece of lead solder).

As indicated earlier, the USEPA and/or the Agency's oversight contractor were on-site throughout the site characterization activities. The USEPA split the samples obtained from borings CSFA-22 and CSFA-27 and collected two other samples and a duplicate for laboratory analysis. The EPA's splits of samples CSFA-22 and CSFA-27 were designated C0252 and C0253, respectively. The other two samples were designated C0254 and C0255. EPA's sample C0256 was a duplicate of sample C0255. These samples were analyzed for the TCL volatile and semivolatile organic compounds, pesticides/PCBs, and the TAL inorganics. The results of the analysis of these samples are summarized in Table 2-2, and a copy of the laboratory data sheets is included in Attachment 2H. As shown on Table 2-2, the results were compared to USEPA Region III generic RBCs and SSLs. The noncarcinogenic compounds were compared to one tenth of their RBCs and SSLs.

A review of Table 2-2 shows that only the volatile organic compound benzene in sample C0255 and its duplicate, sample C0256, was detected above its very stringent USEPA SSL of 0.0018 mg/kg. No other volatile organic compounds were detected above USEPA RBCs/SSLs in the four samples collected from the CSFA by the USEPA. Each of the four samples displayed the semivolatile organic compounds benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, carbazole, dibenzo(a,h)anthracene, and naphthalene (with the exception of sample C0252) above their respective USEPA RBC and SSL. Also, the compounds 2-methylnaphthalene, dibenzofuran and indeno(1,2,3-cd)pyrene were detected above their USEPA RBC/SSL in samples C0254 and C0255. Additionally, benzo(k)fluoranthene and chrysene were detected above their USEPA RBC and SSL in sample C0255 and acenaphthene, fluorene and pyrene were detected above their SSLs in sample C0255. The compound acetophenone was detected above its USEPA SSL in sample C0253.

The PCB aroclor 1254 was detected above its USEPA RBC and SSL in sample C0254 but was not detected above its RBC/SSL in the other three samples. Also, as discussed above, no PCBs were detected in the characterization samples obtained from the CSFA in March 1998/October 1999. The absence of PCBs above USEPA RBCs and SSLs in the other three samples collected by EPA and the three previous characterization samples collected by Penn E&R suggest that PCBs may not be indicative of the makeup of the fill material. The pesticide dieldrin was

detected above its USEPA SSL but not its RBC in samples C0254 and C0255. The pesticide alpha-BHC was detected above its SSL in sample C0255. As indicated in the analytical data package, the laboratory indicated that it believed that the dieldrin peak on the chromatograph for sample C0254 was the result of the presence of the PCB arochlor 1254.

Several metals were detected above their USEPA RBCs and SSLs in each of the four samples.

2.3 Compounds of Concern In the CSFA

This section of the RD/RAWP identifies the compounds of concern (COC) that are present in the CSFA. A particular compound/analyte was selected as a COC if it was detected above either PADEP Act 2 MSCs or USEPA RBCs/SSLs in any of the samples collected from the CSFA. Based on this criteria, the following is a list of the COC that have been identified for the CSFA:

Volatile Organics

Benzene

Semivolatile Organic Compounds

Acenaphthene
Acetophenone
Anthracene
Benzo(a)anthracene
Benzo(a)pyrene
Benzo(b)fluoranthene
Benzo(k)fluoranthene
Carbazole
Chrysene
Dibenzo(a,h)anthracene
Dibenzofuran
Fluorene
Fluoranthene
Indeno(1,2,3-cd)pyrene
2-Methylnaphthene
Naphthalene
Pyrene

Pesticides/PCBs

Dieldrin
Alpha-BHC
PCB aroclor-1254

Metals

Antimony
Arsenic
Barium
Cadmium
Chromium
Lead
Manganese
Iron
Selenium
Silver
Thallium
Zinc

Although 1,2-dibromo-3-chloropropane was detected above its SSL in sample C0254 and methylene chloride was detected in several of the samples above its SSL, these compounds were not identified as COCs. This is because the samples in which these compounds were detected were qualified and flagged with a "B" by the laboratory. The "B" flag is used when an analyte is found in an associated blank and warns that its presence is likely associated with laboratory introduced contamination.

TABLE 2-1A

SUMMARY OF ANALYTICAL RESULTS
FOR SOIL SAMPLES COLLECTED FROM
THE CINDERSLAG FILL AREA
COMPARED TO USEPA REGION III RBCs/SSLs

ANALYTICAL PARAMETERS ⁽¹⁾	SAMPLE DESIGNATION/ANALYTICAL RESULTS ⁽²⁾								GENERIC USEPA RBC ⁽⁴⁾ (INDUSTRIAL)	GENERIC USEPA SSL ⁽⁴⁾ (DAF-20)
	FT-3	CSFA-22	CSFA-23	CSFA-40 ⁽³⁾	CSFA-24	CSFA-25	CSFA-26	CSFA-27		
Volatile Organics:										
Chloromethane	<0.013	<0.017	<0.027	<0.018	<0.023	<0.018	0.005 J	<0.019	440	0.01
Trichlorofluoromethane	<0.013	<0.017	<0.027	<0.018	0.004 J	<0.018	<0.015	<0.019	61,000	2.3
Acetone	<0.013	0.13	0.033	0.019	0.010 JB	0.09	0.03	<0.019	20,000	0.25
Methylene Chloride	0.012 JB	0.005 JB	0.006 JB	0.003 JB	0.003 JB	0.003 JB	0.002 JB	0.002 JB	760	0.019
2-Butanone	<0.013	0.016 J	<0.027	<0.018	<0.023	<0.018	<0.015	<0.019	1.2 x 10 ⁵	0.79
Benzene	<0.013	0.009 J	0.028	0.003 JB	<0.023	0.003 J	0.005 J	<0.019	100	0.0018
Toluene	<0.013	0.088	0.005 J	<0.018	<0.023	0.17	0.059	<0.019	41,000	0.88
Semivolatile Organics:										
2-Methylnaphthalene	<0.44	<0.43	0.073 J	0.17 J	<0.41	<0.45	<0.42	<3.4	41,000	2.2
Acenaphthene	<0.44	0.078 J	<0.45	0.057 J	<0.41	<0.45	<0.42	<3.4	12,000	10
Acenaphthylene	<0.44	0.17 J	0.16 J	0.20 J	<0.41	<0.45	<0.42	<3.4	NSA	NSA
Acetophenone	NA	<0.43	<0.45	0.043 J	<0.41	<0.45	<0.42	<3.4	20,000	0.0002
Anthracene	<0.44	0.49	0.25 J	0.30 J	0.20 J	0.058 J	<0.42	2.1 J	61,000	47
Benzaldehyde	NA	0.050 J	0.26 J	0.16 J	<0.41	<0.45	<0.42	<3.4	20,000	NSA
Benzo (a) anthracene	0.25J	2	0.71	0.87	1.5	0.19 J	0.10 J	12	7.8	1.5
Benzo (a) pyrene	0.24 JB	2.6	0.91	1	2.1	0.24 J	0.14 J	12	0.78	0.37
Benzo (b) fluoranthene	0.34 J	3.1	0.76	1.1	2.5	0.36 J	0.17 J	23	7.8	4.5
Benzo (g,h,i) perylene	0.24 JB	1.3	0.40 J	0.44	<0.41	<0.45	<0.42	6.7	NSA	NSA
Benzo (k) fluorathene	0.079J	2.5	1.1	0.8	2.7	0.20 J	0.16 J	16	78	45
bis (2-Ethylhexyl) phthalate	0.39 J	2.5	0.65	1.3	0.66	0.24 J	0.36 J	1.4 J	410	2,900
Butylbenzylphthalate	<0.44	0.048 J	<0.45	<0.43	<0.41	<0.45	<0.42	<3.4	41,000	1,700
Carbazole	<0.44	0.25 J	0.12 J	0.14 J	0.12 J	<0.45	<0.42	0.73 J	290	0.47
Chrysene	0.27 J	3.2	0.77	0.97	2	0.23 J	0.16 J	16	780	150
Dibenzo (a,h) anthracene	0.074 J	0.8	0.26 J	0.28 J	0.73	0.094 J	0.05 J	4.2	0.78	1.4
Dibenzofuran	<0.44	0.059 J	0.11 J	0.15 J	<0.41	<0.45	<0.42	<3.4	820	0.77
Di-n-butylphthalate	<0.44	<0.43	<0.45	0.057 J	0.049 J	<0.45	<0.42	<3.4	20,000	500
Di-n-octylphthalate	<0.44	<0.43	<0.45	<0.43	0.41 J	<0.45	<0.42	<3.4	4,100	2.4 x 10 ⁵
Fluoranthene	0.34 J	4.0 D	1.3	1.8	2.1	0.31 J	0.17 J	21	8,200	630
Fluorene	<0.44	0.11 J	0.064 J	0.10 J	<0.41	<0.45	<0.42	<3.4	8,200	14
Indeno (1,2,3-cd)pyrene	0.21 J	2	0.66	0.72	1.8	0.21 J	0.13 J	10	7.8	13
Naphthalene	<0.44	0.084 J	0.59	0.83	<0.41	<0.45	<0.42	<3.4	4,100	0.015
N-nitrosodiphenylamine (1)	<0.44	0.17 J	<0.45	<0.43	<0.41	<0.45	<0.42	<3.4	1200	0.76
Phenanthrene	0.13 J	2.3	0.95	1	0.76	0.16 J	0.061 J	11	NSA	NSA
Phenol	<0.44	<0.43	<0.45	0.059 J	<0.41	<0.45	<0.42	<3.4	1.2 x 10 ⁵	13
Pyrene	0.31 J	2.8	1.1	1.5	1.7	0.30 J	0.16 J	20	6,100	68
Inorganics:										
Aluminum	13,800	15,000	10,200	10700	5,410	14,300	9730	13,000	2 x 10 ⁵	NSA
Antimony	7.4 B	25.3 N	8.0 B N	9.3 B N	4 B N	25.8 N	6.6 B N	6.4 B N	82	1.3
Arsenic	19.8	24.3 N	14.1 N	17.3 N	21.7 N	39.4 N	39.9 N	20.3 N	3.8	0.026
Barium	996	449 *	745 *	1460 *	455 *	626 *	534 *	425 *	14,000	210
Beryllium	0.54 B	0.46 B	0.47 B	0.47 B	0.38 B	0.37 B	0.28 B	0.56 B	410	120
Cadmium	8.2	8.6 *	7.1 *	8.1 *	5.1 *	8.1 *	5.8 *	31 *	100	2.7
Calcium	29400	13400 *	20600 *	21600 *	9400 *	28900 *	20400 *	39200 *	NSA	NSA
Chromium	67.5	99.7 N*	67.3 N*	63.6 N*	71.8 N*	196 N*	141 N*	46.6 N*	610	4.2
Cobalt	16.4	18.3	10.9 B	10.6 B	16.5	21.7	17.7	10.2 B	4,100	NSA
Copper	401	428 *	740 *	911 *	249 *	418 *	266 *	225 *	8,200	1,100
Iron	75900	115000 *	76900 *	66600 *	151000 *	128000 *	85400 *	62100 *	61,000	NSA
Lead	2390	6230 *	1490 *	25000/1010 ⁽⁵⁾	619 *	1920 *	808 *	1870 *	750	NSA
Magnesium	4690	3870 *	4480 *	5280 *	1740 *	12800 *	5530 *	3450 *	NSA	NSA
Manganese	744	740	4560	4930	869	832	638	975	4,100	9.5
Mercury	0.25	0.3	1.2	0.87	3.9	0.42	0.18	0.16	20	NSA
Nickel	92	72.4	65	51.7	70.7	175	100	38.4	4,100	NSA
Potassium	2100	867 B E	762 B E	783 B E	404 B E	1110 B E	946 B E	734 B E	NSA	NSA
Selenium	<0.72	4.1	4	4	4.4	3.2	1.9	2.3	1,000	1.9
Silver	3.1	1.4 B	4.7	7	1.6 B	1.3 B	1.8 B	2.0 B	1,000	3.1
Sodium	<52.5	<41.9	<41.4	<42.4	<40.5	<44.1	<42.5	<40.5	NSA	NSA
Thallium	0.78 B	17.3 N	11.6 N	9.7 N	25.8 N	16.7 N	13.2 N	8.0 N	14	0.36
Vanadium	28	24.2	31	38.1	20	23.6	17.4	21.4	1,400	510
Zinc	5620	4970	2,890	3580	1000	7280	3880	2,800	61,000	1,400
Cyanide	<1.33	3.3	4.7	3.6	0.6 B	0.79	0.38 B	0.056 U	4,100	15
Sample Collection Depth ⁽⁶⁾	10.5	2-4	4-8	4-8	3-4	0-4	3-6	3-4	-----	-----

Notes:

- (1) - Each sample was submitted for laboratory analysis of the TCL volatile and semi-volatile organic compounds and the TAL inorganics (including cyanide). Only those compounds which were detected above the laboratory method detection limit (MDL) are shown.
- (2) - All results are in milligrams per kilogram.
- (3) - This is a duplicate of sample CSFA-23
- (4) - United States Environmental Protection Agency, Region III Risk-Based Concentrations and Soil Screening Levels for Soils (5/8/01).
One-tenth of the RBC/SSL for non-carcinogenic compounds are listed.
- (5) - This sample was analyzed twice for lead. The first analysis revealed lead at 25,000 mg/kg and the second analysis of a split from the sample displayed lead at 1,010 mg/kg.
- (6) - Sample collection depths are in feet below the ground surface
- USEPA - United States Environmental Protection Agency
- RBC - Risk-Based Concentration
- SSL - Soil Screening Level
- MSC - Medium-Specific Concentration
- NSA - No standard available
- NA - Not analyzed
- * - The results for the sample and the laboratory duplicate results are not within control limits.
- B (Inorganics) - Indicates that the analyte was analyzed for and the reported value was obtained from a reading that was less than the Contract Required Detection Limit but greater than or equal to the Instrument Detection Limit.
- B (Organics) - This flag is used when the analyte is found in the associated blank as well as the sample. It indicates probable blank contamination and warns the data user to take appropriate action.
- D - Indicates that the sample was re-analyzed at a higher dilution factor.
- E - Indicates an estimated value for metals analysis.
- J - Indicates an estimated value.
- N - This flag indicates the sample spike recovery is outside of control limits.
- <10 - Compound was not detected above the detection limit shown
- Bold - Compound was detected above its EPA RBC and/or SSL.

TABLE 2-2

**SUMMARY OF ANALYTICAL RESULTS
FOR SOIL SAMPLES COLLECTED FROM
THE CINDER/SLAG FILL AREA BY THE USEPA**

ANALYTICAL PARAMETERS ⁽¹⁾	SAMPLE DESIGNATION/ANALYTICAL RESULTS ⁽²⁾					GENERIC USEPA RBC ⁽⁴⁾ (INDUSTRIAL)	GENERIC USEPA SSL ⁽⁴⁾ (DAF-20)
	C0252	C0253	C0254	C0255	C0256 ⁽³⁾		
<i>Volatile Organics:</i>							
Trichlorofluoromethane	<0.012	<0.013	0.001J	<0.011	<0.011	61,000	2.3
Acetone	0.004 BJ	0.005BJ	0.003BJ	0.064B	0.038B	20,000	0.25
Carbon Disulfide	0.002 J	0.004J	0.004J	0.002J	0.002J	20,000	1.9
Methylene Chloride	0.04 B	0.059B	0.0069B	0.040B	0.04B	760	0.019
2-Butanone	0.002 BJ	0.003BJ	0.002BJ	0.006BJ	0.004BJ	1.2 x 10 ⁵	0.79
Cyclohexane	0.002 J	0.005J	<0.012	0.005J	0.004J	NSA	NSA
Benzene	<0.012	<0.013	<0.012	0.015	0.015	100	0.0018
Styrene	<0.012	<0.013	<0.012	0.002J	0.002J	41,000	5.7
Toluene	<0.012	0.005J	0.003J	<0.028	0.03	41,000	0.88
1,2,4,- Trichlorobenzene	0.001 BJ	<0.013	0.001BJ	<0.011	<0.011	2,000	0.75
Xylene (total)	<0.012	<0.013	0.002BJ	0.003BJ	0.004BJ	4.1 x 10 ⁵	23
1,2-Dibromo-3-chloropropane	<0.012	<0.013	0.001BJ	<0.011	<0.011	4.1	0.00087
<i>Semivolatile Organics:</i>							
2-Methylnaphthalene	<12	0.11J	15DJ	18J	22J	4,100	2.2
Acenaphthene	<12	0.18J	<12	15J	22J	12,000	10
Acenaphthylene	<12	0.74DJ	6.8DJ	180DJ	370DJ	NSA	NSA
Acetophenone	1.9 BJ	0.14J	1.7DBJ	4.9BJ	<110	20,000	0.0002
Anthracene	3.5 J	1.3 DJ	6.6DJ	430DJ	810DJ	61,000	47
Benzaldehyde	<12	0.18J	<12	<66	<110	20,000	NSA
Benzo (a) anthracene	18	6.3D	17DJ	950D	2,100D	7.8	1.5
Benzo (a) pyrene	14	6.7DJ	13DJ	760D	1,700D	0.78	0.37
Benzo (b) fluoranthene	16	6D	12DJ	650DJ	1,500D	7.8	4.5
Benzo (g,h,i) perylene	15	6.8D	11DJ	590DJ	1,200D	NSA	NSA
Benzo (k) fluoranthene	15	5.5D	14DJ	660D	1,400D	78	45
bis (2-Ethylhexyl) phthalate	1.5 J	4.3D	2DJ	5.3J	100DJ	410	2,900
Carbazole	1.3 J	0.59DJ	1.8DJ	52DJ	74DJ	290	0.47
Chrysene	24	7.3D	16DJ	870D	1,800D	780	150
Dibenzo (a,h) anthracene	4.6J	2.1DJ	3.4DJ	180DJ	380DJ	0.78	1.4
Dibenzofuran	<12	0.19J	8.4DJ	56DJ	91DJ	820	0.77
Di-n-butylphthalate	<12	0.092J	<12	<66	<110	20,000	500
Di-n-octylphthalate	<12	<4.2	<12	<66	<110	4,100	2.4 X 10 ⁵
Fluoranthene	35	9.9D	33DJ	2,600D	5,300D	8,200	630
Fluorene	<12	0.29DJ	2.2DJ	150DJ	260DJ	8,200	14
Indeno (1,2,3-cd)pyrene	<12	5.9D	10DJ	540DJ	1,200D	7.8	13
Naphthalene	<12	0.49DJ	180D	36DJ	53J	4,100	0.015

TABLE 2-2 - CONTINUED

SUMMARY OF ANALYTICAL RESULTS
FOR SOIL SAMPLES COLLECTED FROM
THE CINDER/SLAG FILL AREA BY THE USEPA

ANALYTICAL PARAMETERS ⁽¹⁾	SAMPLE DESIGNATION/ANALYTICAL RESULTS ⁽²⁾					GENERIC USEPA RBC ⁽⁴⁾ (INDUSTRIAL)	GENERIC USEPA SSL ⁽⁴⁾ (DAF-20)
	C0252	C0253	C0254	C0255	C0256 ⁽³⁾		
N-nitrosodiphenylamine (1)	<12	0.27J	<12	<66	<110	1200	0.76
Phenanthrene	19	4.8D	42D	1,000D	1,700D	NSA	NSA
Phenol	<12	0.069J	1.8DJ	6.1J	9J	1.2 x 10 ⁵	13
Pyrene	28	9.1D	24DJ	1,700D	3,400D	6,100	68
4-Methylephenol	<12	1.3J	1.3J	3.6J	<110	1,000	NSA
1,1-Biphenyl	<12	2.9DJ	2.9DJ	5.2J	6.6J	10,000	96
Pesticides/PCBs:							
Heptachlor	0.005	0.00084PJ	<0.002	<0.0019	<0.0019	1.3	0.84
4,4-DDE	0.0011	0.0027PJ	<0.0038	<0.0037	<0.0038	17	35
4,4-DDD	0.0094	0.0019PJ	<0.0038	<0.0037	<0.0038	24	11
4,4-DDT	0.013	<0.0042	<0.0038	0.052DP	<0.0038	17	1.2
Endrin	<0.0041	0.037P	0.092DP	<0.0037	0.016P	61	0.54
Endrin-Ketone	0.051	<0.0042	0.016DJ	0.22D	0.1DP	NSA	NSA
Endrin-Aldehyde	0.0062	<0.0042	5.3DP	0.045P	<0.0038	NSA	NSA
Gamma-Chlordane	0.0021	0.0054P	0.019P	0.025DP	0.0087DPJ	16	0.92
Aldrin	<0.0021	<0.0022	0.0069DPJ	<0.0019	<0.0019	0.34	0.0077
Dieldrin	<0.0041	<0.063	0.27DP	0.0036DPJ	<0.0038	0.36	0.0022
Endosulfan I	<0.0021	<0.0022	<0.02	<0.019	0.0027DPJ	NSA	NSA
Endosulfan II	<0.0041	<0.0042	0.006DPJ	<0.0019	<0.0038	NSA	NSA
Alpha-BHC	<0.0021	<0.0022	<0.02	0.0042DPJ	0.0062DPJ	0.91	0.00089
Delta-BHC	<0.0021	<0.0022	<0.02	<0.019	0.013DJ	3.2	NSA
Aroclor 1254	<0.041	0.89P	5.3DP	<0.037	<0.038	2.9	1.1
Metals:							
Aluminum	8,850	19,900	8,110	5560	5,430	2 x 10 ⁵	NSA
Antimony	<0.96	<1.0	<0.89	<0.88	<0.86	82	1.3
Arsenic	9.2	20.3	26.6	20.8	16.8	3.8	0.026
Barium	413	543	244	272	191	14,000	210
Beryllium	0.28 B	<0.26	0.49 B	<0.22	<0.22	410	120
Cadmium	28.6	4.3	<0.22	19.6	6.4	100	2.7
Calcium	22100	11,300	8,160	15800	9,820	NSA	NSA
Chromium	44.6	79.9	33.1	48.3	35.3	610	4.2
Cobalt	7.8 B	25.7	8.2 B	8.1 B	8.0 B	4,100	NSA
Copper	140	490	140	474	392	8,200	1,100
Iron	26700	153000	49,400	44200	28,200	61,000	NSA
Lead	1280	1,880	1,600	991	629	750	NSA
Magnesium	1810	3,010	1,550	1910	3,150	NSA	NSA

TABLE 2-2 - CONTINUED

**SUMMARY OF ANALYTICAL RESULTS
FOR SOIL SAMPLES COLLECTED FROM
THE CINDER/SLAG FILL AREA BY THE USEPA**

ANALYTICAL PARAMETERS ⁽¹⁾	SAMPLE DESIGNATION/ANALYTICAL RESULTS ⁽²⁾					GENERIC USEPA RBC ⁽⁴⁾ (INDUSTRIAL)	GENERIC USEPA SSL ⁽⁴⁾ (DAF-20)
	C0252	C0253	C0254	C0255	C0256 ⁽³⁾		
Manganese	446	1,420	1260	365	317	4,100	9.5
Mercury	0.24	0.33	11	5.1	0.85	20	NSA
Nickel	20.2	74.2	28.6	28.4	33.9	4,100	NSA
Potassium	449 B	756 B	970 B	549 B	503 B	NSA	NSA
Selenium	1.8	6.4	3.0	9.1	5.9	1,000	1.9
Silver	0.67 B	1.2 B	0.47 B	0.72 B	<0.43	1,000	3.1
Sodium	444 B	505 B	470 B	425 B	375 B	NSA	NSA
Thallium	<1.4	<1.6	<1.3	2.3	<1.3	14	0.36
Vanadium	15.5	19.5	25.8	10.6 B	15.0	1,400	510
Zinc	1940	3830	706	24900	1540	61,000	1,400

Notes:

(1) Each sample was submitted for laboratory analysis of the TCL volatile and semi-volatile organic compounds, pesticides/PCBs, and the TAL inorganics. Only those compounds which were detected above the laboratory method detection limit (MDL) are shown.

(2) All results are in milligrams per kilogram.

(3) This is a duplicate of sample C0255

(4) United States Environmental Protection Agency, Region III Risk-Based Concentrations and Soil Screening Levels for Soils (5/8/01).
One-tenth of the RBC/SSL for non-carcinogenic compounds are listed.

USEPA - United States Environmental Protection Agency

RBC - Risk-Based Concentration

SSL - Soil Screening Level

NSA - No standard available

B (Inorganics) - Indicates that the analyte was analyzed for and the reported value was obtained from a reading that was less than the Contract Required Detection Limit but greater than or equal to the Instrument Detection Limit.

B (Organics) - This flag is used when the analyte is found in the associated blank as well as the sample. It indicates probable blank contamination and warns the data user to take appropriate action.

D - Indicates that the sample was re-analyzed at a higher dilution factor.

P - This flag indicates that there was greater than a 25 percent difference for detected concentrations between the two GC columns.

J - Indicates an estimated value.

N - This flag indicates the sample spike recovery is outside of control limits.

<12 - Compound was not detected above the detection limit shown

Bold - Compound was detected above its EPA RBC and/or SSL.

4.0 REMEDIAL ACTION AND IMPLEMENTATION

This section of the RD/RAWP discusses the remedial action proposed for the cinder/slag fill area (CSFA) and why the selected remedy meets the requirements of the ROD, and outlines the procedures and methodologies that will be followed during the implementation of the selected remedy.

4.1 Proposed Remedial Action

The proposed remedy for the CSFA is to excavate the material, load it into DOT approved trucks, and transport it off-site for disposal. As discussed in Section 2.0 (Site Characterization Activities) and to be detailed in Section 7.0 (Site Management Plan), the material in the CSFA has been previously characterized and accepted for disposal at Waste Management's Pottstown, PA landfill. Therefore, all material removed from the CSFA will be transported under manifest to Waste Management's Pottstown, PA landfill.

Upon completion of the removal activities, post-excavation soil samples will be collected and analyzed for the selected contaminants of concern. As discussed in Section 4.3, a focused risk assessment using the results of the post-excavation samples will be then completed. If the results of the risk assessment indicate that the remaining soils do not present an unacceptable risk to human health or the environment, the excavated area will be backfilled. If the risk assessment suggests that an unacceptable risk exists, additional excavation of those areas contributing to the unacceptable risk, as discussed below, will be completed. This process will be continued until the results of the risk assessment indicate that all unacceptable risks to human health have been eliminated.

The proposed remedial action for the CSFA will meet the Remedial Action Objectives for soils outlined in Section VIII of the ROD. That is, the excavation and off-site disposal of the material in the CSFA will: 1) eliminate exposure to soil which presents an unacceptable risk to human health or the environment; and 2) prevent contact of soil constituents with other media such as ground water and surface water which may transport the contamination so that the transport does not create an unacceptable risk to human health or the environment. Further, the proposed remedial action for the CSFA will meet the applicable Performance Standards outlined in Section XII of ROD. LPT will ensure the compliance with the applicable performance standards as described below.

1. The remedy will comply with all federal and state ARARs listed in Table 14 in the ROD, a copy of which is included in Attachment 4A.
2. As discussed in Sections 2.0 and 7.0, the materials to be excavated have been characterized and they are not characteristically hazardous. Therefore, the Pennsylvania Residual Waste Regulations regarding pre-transport and storage requirements will be complied with.
3. Not applicable.
4. As discussed in Section 7.0, all wastewater generated during decontamination activities will be properly managed in accordance with State and Federal regulations.

- 5.- 8. Not applicable.
9. As all hazardous substances will be removed from the CSFA, no statutory reviews under Section 121(c) of CERCLA will be required.
10. As all hazardous substances will be removed from the CSFA, no institutional controls will be required.
11. As discussed below in Section 4.2, the structural stability of any open excavations will be maintained with temporary shoring or engineering measures as is appropriate. Also, as discussed in Section 6.0, air monitoring will be conducted during the excavation activities to ensure the safety of site workers and residents living in the vicinity of the CSFA.
12. As discussed below in Section 4.2, erosion and sedimentation controls as required by the PADEP and Montgomery County Conservation District will be implemented to minimize erosion potential. Contaminated fill from the CSFA will be prevented from being washed into on-site surface water and adjacent uncontaminated and uncontrolled wetland areas during remedial action implementation.
13. As discussed in Sections 4.2 and 5.0, post-excavation sampling will be implemented after the excavation activities have been completed. No site-specific cleanup performance standards were included in the ROD for the CSFA. Therefore, a site-specific focused risk assessment, as discussed in Section 4.3, will be implemented upon collection of the post-excavation soil samples. The results of this risk assessment will be used to ensure that all remaining soils are within EPA's acceptable risk-range and that all unacceptable risks to human health have been eliminated.
14. The excavation will be backfilled using clean soil. The backfill will be compacted and the area, in accordance with approved construction plans for the site, will be covered with a parking garage associated with the building to be constructed at the site.
15. Not applicable.
16. Not applicable.
17. Not applicable.
18. As discussed in Sections 2.0 and 7.0, the material in the CSFA has already been characterized and is not characteristically hazardous.

Finally, the remedy selected for the CSFA meets the Statutory Determinations of Section XIII of the ROD. That is, the remedy is protective of human health and the environment, will comply with all applicable or relevant and appropriate requirements, provides the best overall protection in proportion to cost, and utilizes a permanent solution. Treatment of the fill in the CSFA was not selected due to the community's preference for removal of the source area.

4.2 Implementation of Remedial Action

This Section of the RD/RAWP details the procedures and methodologies that will be followed in implementing the selected remedy.

4.2.1 Site Preparation

Permits

Prior to the initiation of any remedial activities, all required permits, as outlined in Section 8.0, will be obtained. Currently, Penn E&R is not aware of any permits that will be required to implement these remedial activities. Penn E&R has assumed that the approval of this RD/RAWP will be the only approval/permits required by the USEPA and/or the PADEP to implement the proposed remedial activities.

In addition, Penn E&R has spoken directly with Mr. Rob Loeper, Safety and Code Enforcement Officer for Upper Merion Township. Penn E&R explained to Mr. Loeper the proposed remedial activities (i.e., excavation and off-site disposal) that would be completed in the CSFA and informed Mr. Loeper that LPT was in the process of developing work plans that would have to be submitted to and approved by the USEPA and PADEP prior to implementation of the remedial activities. Based on this, Mr. Loeper indicated that a permit was not required from the Township as this work would be covered under LPT's current permits for their on-site construction activities.

The Montgomery County Conservation District (MCCD) requires the implementation of a written Erosion and Sedimentation Control (ESC) Plan for excavations exceeding 5,000 square feet but less than five acre. Unless mandated by permits issued by other entities, the MCCD does not require involvement in the preparation or implementation of the ESC Plan and does not require a formal permit to initiate the excavation/construction activity. Since the remediation of the CSFA will disturb more than 5,000 square feet but less than five acres, Penn E&R has developed a written ESC Plan for this project. A copy of the ESC Plan, which was developed in accordance with the 1995 document developed by the Southeast Pennsylvania Association of Conservation Districts entitled "Erosion and Sedimentation Control Plan Guide For Small Projects" is included in Attachment 4B.

Security

A high visibility fence is already located around the perimeter of the CSFA. This fence will be maintained throughout the excavation and backfilling operations. The areas within the fence will be considered the exclusion zone. Only personnel who are 40-hour OSHA trained and have reviewed the site-specific Health and Safety Plan, and which are required to implement the remedy, will be allowed inside the exclusion zone. No trucks that will be used to transport the fill off-site for disposal will be allowed within the exclusion zone. No fill material removed from the CSFA will be placed outside of the fence at any time. The location of the high visibility fence that is in-place and which will be maintained throughout the remedial activities is shown on Figure 4-1.

Implementation of Erosion and Sedimentation Control Plans

Prior to the initiation of any excavation activities, all required erosion and sedimentation control devices, as outlined in the site-specific ESC Plan included in Attachment 4B will be installed.

Installation of a Truck Wheel Wash/Decontamination/Pad and Construction Entrance

There is a construction entrance for the 2301 property already in-place in the northeast portion of the site at the approximate location shown on Figure 4-2. The construction entrance is located at the southeast end of the asphalt driveway that is used to access the site from Renaissance Boulevard and Horizon Drive. This entrance was installed as part of the on-going site construction activities and is about 40 feet long by 40 feet wide and consists of 6-inches of rip-rap. During the remedial activities, heavy equipment and the trucks used to transport the fill from the CSFA to the landfill will use this construction entrance to enter and exit the site. Prior to the initiation of the remedial activities, 6-inches of additional rip-rap will be placed over the construction entrance. The construction entrance will be maintained throughout the duration of the excavation and backfilling activities.

The construction entrance will be connected to the CSFA via a temporary dirt access road. The location of the temporary dirt access road is shown on Figure 4-2. This access road is flat and is currently being used to access other portions of the site. This road will be sufficient to allow access to the CSFA and will be used by all equipment and trucks entering/leaving the CSFA area. As discussed below, this road will be routinely sprayed with water to eliminate dust generated by trucks/equipment using this road to access the CSFA.

The temporary dirt access road will terminate at the truck loading and turnaround area to be constructed immediately adjacent to the southeast corner of the CSFA as shown on Figure 4-2. The truck loading and turnaround area will be constructed of 6 to 8-inches of rip rap and will be about 120 feet long by 60 feet wide. This area will provide a sufficient amount of room to load out the trucks and then allow them to turnaround and leave the area via the dirt access road. Although no trucks used to haul the fill to the landfill will be allowed to enter the CSFA, a truck tire-wash/decontamination pad will be constructed within and at the southeast corner of the truck loading and turnaround area (see Figure 4-2). This pad will be used, if required, to wash the tires of any trucks, which may have inadvertently entered the CSFA prior to them leaving the loading and turnaround area. Also, all heavy equipment used within the CSFA will be decontaminated on this pad prior to the equipment being allowed to leave the site. The decontamination pad will be about 25 feet long by 15 feet wide.

The area over which the truck tire-wash/decontamination pad will be placed will be excavated to a depth of 12-inches. This area will then be lined with a layer of 12-mil plastic. A sump will be excavated in one corner of the pad and a metal drum will be placed within the sump. The drum/sump will be lined with 12-mil plastic. A layer of 8-ounce geotextile fabric will be placed immediately above and below the plastic liner. The pad will be constructed and sloped such that water that collects on the pad will drain towards and into the drum/sump. After the plastic and geotextile fabric have been installed, a 3-inch layer of sand will be placed on top of the plastic,

which will then be covered by 9-inches of rip rap. All trucks which leave the CSFA will be required to drive onto the decontamination pad. The trucks will then be visually inspected to make sure that there is not dirt or mud on the tires of the truck. If required, the tires of the trucks will be rinsed prior to leaving the loading and turnaround area.

As indicated above, all trucks will leave the property via the construction entrance (see Figure 4-2). A final inspection of each truck that leaves the CSFA will be completed at the construction entrance. If any dirt is visible on the wheels of the trucks, the tires will be sprayed down with water so that this dirt is not tracked off of the site.

As discussed in Section 7.0, all wash water generated during the decontamination process will be pumped from the sump into a temporary 400-gallon aboveground tank. The water in the tank will be sprayed over the CSFA to suppress the generation of any dust. Any water not used to suppress dust will be characterized and disposed off-site at a properly permitted facility. The EPA will be notified prior to any off-site shipments of decontamination water. Also, no spraying of wash water will be completed in areas where all fill has been removed and post excavation samples collected.

4.2.2 Excavation of the CSFA

As discussed in Section 3.0, the material in the CSFA consists primarily of glass, ash, cinders, coal dust and slag. There is a very small quantity of tar-like material located on the surface of this area. As shown on Figure 4-1, the surface expression of the CSFA encompasses an area, on average, about 240 feet long by 125 feet wide. The thickness of the fill ranges from 1-foot along the perimeter of the area to up to 12 feet in the central portion of the CSFA. However, the fill material is, on average, from 3 to 4 feet thick. There is approximately 4,000 cubic yards of fill located in this area.

The fill material in the CSFA will be excavated by Allen A. Meyer's (AAM) and overseen and directed by personnel from Penn E&R. (The Site Management Plan included in Section 7.0 describes the responsibilities of all on-site contractors and other personnel). As discussed in Section 6.0, all AAM and Penn E&R on-site personnel will be 40-hours OSHA trained. No one will be allowed within the exclusion zone that is not 40 hour OSHA trained. Penn E&R will have an on-site Health and Safety Coordinator oversee all on-site excavation activities to ensure that these activities are completed safely and in accordance with the requirements of the Site-Specific Health and Safety Plan (see Section 6.0). The on-site Health and Safety Coordinator will monitor ambient air for total dust and volatile organic vapors throughout the excavation activities.

The fill material from the CSFA will be excavated using a dozer/trac-loader and an excavator. The dozer will be used to push the fill to the southeast corner of the CSFA where the excavator will be located and used to load-out the trucks that will transport the material off site for disposal. The dozer will start at the western and northern ends of the CSFA and will slowly push the fill, which will be removed in lifts, to the southeast corner of the CSFA. The excavator will then be used to load-out DOT approved trucks, which will transport the fill to Waste Management's Pottstown, PA landfill. Penn E&R currently anticipates being able to load out

about 25 trucks per day or 500 cubic yards of fill. Based on this estimate, the excavation activities will require about 8 to 10 days to complete.

The Penn E&R Field Operations Manager (FOM) will be on-site to direct the excavation activities. During the excavation activities, ambient air will be screened for volatile organic vapors and dust levels. Although measurements will be collected throughout the CSFA, monitoring for organic vapors and dust levels will focus on areas located immediately downwind of areas being excavated and the truck loading area. The site-specific Health and Safety Plan (see Section 6.0) has established action levels for both volatile organic vapors and total dust in ambient air. If either of these action levels are exceeded, work will be stopped until the Corporate Health and Safety Coordinator can evaluate and implement, if required, additional safety precautions. The fill material will be excavated until native soils are encountered. Due to the characteristics of the fill, which is very black in color, the native soil/fill horizon will be easy to visually identify. Once at this horizon, an additional 3 to 6-inches of soil will be excavated. This soil will be disposed of off-site with the fill material.

As indicated above, the fill material will be loaded directly into DOT approved tri-axle dump trucks using an excavator. The fill will be loaded into the trucks near the southeast corner of the CSFA. The trucks will not be allowed to enter the CSFA and will remain outside the fence on the loading/turnaround area. Therefore, they will never be located on any potentially impacted material. The area over which the trucks will be loaded will be covered with 3/4-inch plywood. Therefore, if any fill material is spilled onto the truck turnaround/loading area, it can be easily swept up and placed back into a truck or the CSFA.

After being loaded, each truck will be required to stop at the truck tire wash/decontamination pad. The trucks will be visually inspected to ensure that the loads have been covered with a tarp and that there is no soil/mud on the tires, which could be tracked off-site. If required (i.e., there is mud or other debris on the tires which could be tracked off-site) the tires of the trucks will be rinsed off prior to the trucks leaving the truck tire wash/decontamination pad. Prior to leaving the truck tire wash/decontamination pad, the FOM will make sure that each truck has a separate properly completed manifest and is properly placard to indicate that it is transporting a residual waste. The trucks will follow the temporary dirt access road to the construction entrance where they will leave the site via the asphalt driveway that connects to Renaissance Boulevard and Horizon Drive (see Figure 4-2).

As indicated above, all trucks will leave the property via the construction entrance. A final inspection of each truck that leaves the CSFA will be completed at the construction entrance. If any dirt is visible on the wheels of the trucks the tires will be sprayed down with water so that this dirt is not tracked off the site.

In an effort to reduce the generation of dust as much as possible, the fill material will be excavated and moved slowly. Also, during the on-site excavation activities, if water is not available from the decontamination pad, a water truck will be used to wet down the fill material being excavated/loaded to reduce the generation of dust. If required, the temporary access road, connecting the truck loading/turnaround area to the construction entrance, will be wet down as well with water from the water truck. The asphalt driveway leading from the construction

entrance to Renaissance Boulevard and Horizon Drive will be cleaned each day with a wet-street sweeper.

The dozer/track-loader, the excavator and any other equipment used to excavate the fill material will remain inside the exclusion zone at all times. If they need to be removed from the exclusion zone prior to the completion of the remedial activities and at the completion of the excavation activities, the equipment will be cleaned with a high-pressure washer on the decontamination pad. Any water generated during this process will be pumped from the sump at the decontamination pad into a temporary 400-gallon aboveground storage tank. This water along with any water generated during the rinsing of truck tires will be used for dust suppression within the CSFA.

As discussed below, post-excavation soil samples will be collected to verify the effectiveness of the remedial activities. These samples will be collected as the excavation activities proceed and the samples will be analyzed using an accelerated laboratory turnaround of 5-days. Therefore, as individual sections of the CSFA are remediated, the focused risk assessment activities outlined below in Section 4.3 can proceed. This approach will minimize the amount of time that the excavation will need to remain open.

4.2.3 Post-Excavation Soil Sampling

To verify the effectiveness of the remedial activities and ensure that remaining soils do not present an unacceptable risk to human health, post-excavation soil samples will be collected from the CSFA. One post-excavation soil sample will be collected per 50 feet of excavation sidewall and one sample will be collected from the bottom of the excavation per 900 square feet (i.e., 30 foot by 30 foot) of area excavated. If there is no sidewall in a portion of the excavation, this area will be incorporated into the sampling of the bottom of the excavation. Based on the current dimension of the CSFA, this sampling approach will result in the collection of fourteen soil samples from the excavation sidewalls and thirty-three from the bottom of the excavation for a total of forty-eight soil samples. This sampling approach also meets and exceeds the requirements of Pennsylvania's Land Recycling and Environmental Remediation Standards Act (Act 2), which requires the collection of twelve post-excavation samples per 3000 cubic yards of soil removed.

The sidewall samples will be collected at 50-foot centers around the perimeter of the excavation. The samples will be collected from the mid-point of the sidewall. That is, if the sidewall is 3 feet high at the selected location, the post-excavation sample will be collected from a depth of 1.5 feet below the ground surface (BGS). The samples from the bottom of the excavation will be collected by establishing a 30-foot by 30-foot grid over the CSFA. One sample will then be collected from the center of each of the individual grids from the bottom of the excavation. The sample will consist of soils from 0 to 6-inches into the face of the sidewall or from 0 to 6-inches below the bottom of the excavation. Figure 4-3 shows the location at which the post-excavation soil samples will be collected from the cinder/slag fill area.

The post-excavation soil samples will be collected following the procedures outlined in Section 5.0. Each sample will be collected using a decontaminated stainless steel hand-held bucket auger

or spoon. Only grab samples will be collected; no compositing will be completed. The volatile organic fraction for each sample will be collected directly from the sidewall/bottom of the excavation using an Encore™ sampler. The portion of the sample to be submitted for analysis of metals and semivolatile organic compounds will be thoroughly homogenized in a decontaminated stainless steel mixing bowl and then placed directly into laboratory supplied bottles. The samples will be placed in coolers and shipped under chain-of-custody to the laboratory for analysis. For quality assurance/quality control purposes (QA/QC), a blind duplicate sample, a matrix spike and spike duplicate, and an equipment rinsate blank will be collected at a rate of 1 per 20 environmental samples collected. A trip blank will accompany each shipment of samples to the laboratory.

Each post-excavation soil sample will be analyzed for the compounds of concern as identified during the previous site characterization activities. As discussed in Section 2.0, these compounds of concern include the volatile organic compound benzene; the semivolatile organic compounds acenaphthene, acetophenone, anthracene, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, carbazole, chrysene, dibenzo(a,h)anthracene, dibenzofuran, fluorene, fluoranthene, indeno(1,2,3-cd)pyrene, 2-methylnaphthalene, naphthalene, and pyrene; the pesticides dieldrin and alpha-BHC; the PCB aroclor-1254; and the metals antimony, arsenic, barium, cadmium, chromium, lead, manganese, iron, selenium, silver, thallium and zinc. The duplicates, equipment rinsate blanks, and matrix spike/spike duplicates will be analyzed for the aforementioned compounds of concern. The trip blanks will be analyzed for benzene only. The samples will be analyzed by CompuChem, an EPA approved CLP laboratory located in Cary, NC. The volatile and semivolatile organic analyses will be performed using USEPA Method OLM04.2 and the metal analyses will be performed using USEPA Method ILM04.1.

As discussed below in Section 4.3, a Focused Risk Assessment (FRA) will be implemented using the results of the post-excavation samples to demonstrate that soils remaining in the CSFA after completion of the remedial activities do not present an unacceptable risk to human health. If, upon completion of the FRA, the cumulative carcinogenic risks and non-carcinogenic hazard indices are within USEPA's risk range, then no further action will be required and the CSFA will be backfilled. If the cumulative risk is outside the risk range, then the samples with the major contribution to the risk will be identified. Once identified, additional excavation of soil in the areas represented by these samples will be implemented.

If unacceptable risks are exhibited by a bottom post-excavation sample, an additional 6-inches of soil from within the 30-foot by 30-foot area represented by that particular sample will be excavated and shipped off-site for disposal. If unacceptable risks are exhibited by a sidewall sample, an additional 6-inches of soil will be removed along the entire face of the sidewall. The area that is re-excavated will incorporate 25 feet on either side of the original sidewall post-excavation sample that displayed the unacceptable risk. Additional post-excavation samples will then be collected from the new excavation face directly beneath/adjacent to the original post-excavation sample location. These additional samples will be analyzed for the compounds of concern. The FRA, as described below in Section 4.3, will then be implemented using the new post-excavation sample results to assure that the cumulative risk for the entire area is within USEPA's Risk range.

All post-excavation soil sample locations will be staked and numbered so that they can be re-established in the event additional excavation is required.

4.2.4 Backfilling

Upon completion of the Focused Risk Assessment and confirmation that no unacceptable risks remain, the excavation will be backfilled. The excavation will be backfilled with clean soil imported from off-site. The backfill will be rolled and compacted as required by the site construction plans. As part of the development of the site, a concrete parking garage will be constructed over the CSFA upon completion of the remedial activities.

In an effort to reduce the generation of dust as much as possible, a water truck will be available to wet down the soil as the excavation is being backfilled. If required, the temporary access road, connecting the truck loading/turnaround area to the construction entrance, will be wet down as well. The asphalt driveway leading from the construction entrance to Renaissance Boulevard/Horizon Drive and Renaissance Boulevard and Horizon Drive will be cleaned each day with a wet-street sweeper. The trucks that are used to haul in the soil to be used for backfill will be visually inspected to ensure that there is no soil/mud on the tires, which could be tracked off-site. If required (i.e., there is mud on the tires which could be tracked off-site) the tires of the trucks will be rinsed off at the truck tire wash/decontamination pad prior to the trucks leaving the site.

4.3 Site-Specific Focused Risk Assessment

As discussed above, post-excavation soil samples will be collected from the CSFA after the remedial activities have been implemented and all potentially impacted material has been removed. However, no site-specific cleanup standards were included in the ROD for the post-excavation soil samples to be collected from CSFA. Therefore, based upon discussions with and approval of the USEPA, a Focused Risk Assessment (FRA) will be implemented using the results of the post-excavation samples to demonstrate that soils remaining in the CSFA after completion of the remedial activities do not present an unacceptable risk to human health or the environment. The FRA will be completed in accordance with the procedures included in the following documents:

- USEPA 1989. Risk Assessment Guidance for Superfund (RAGS): Volume I Human Health Evaluation Manual (HHEM), Part A, Interim Final. Office of Emergency and Remedial Response, Washington, DC. EPA/540/1-89/002.
- USEPA 1998. Risk Assessment Guidance for Superfund (RAGS): Volume I Human Health Evaluation Manual (HHEM), Part D, Standardized Planning, Reporting, and Review of Superfund Risk Assessments. Office of Emergency and Remedial Response, Washington, DC. EPA/540/R-97033.

This Focused Risk Assessment will use the results generated from the post-excavation samples to be collected from the CSFA. Because the post-excavation samples will be obtained from areas to be subsequently covered with at least 2 feet of fill and an asphalt parking lot or which will be located below a concrete parking garage, only potential risks to on-site adult construction workers will be evaluated. The FRA will be based on the traditional four-step risk assessment process defined by the National Academy of Sciences (1983) in its report, "Risk Assessment in the Federal Government: Managing the Process". These steps were reaffirmed by the Academy in their 1994 publication titled "Science and Judgment in Risk Assessment." These steps are as follows:

- Hazard Identification/Identification of Compounds of Concern
- Exposure Assessment
- Toxicity Assessment
- Risk Characterization

The activities to be implemented as part of each step of the FRA are discussed below.

Hazard Identification/Identification of Compounds of Concern

This step includes the identification of the Compounds of Concern (COC) that will be evaluated as part of the FRA. As indicated in Section 2.3, the COC for which the post-excavation soil samples will be analyzed have already been identified. These COC include the following:

Volatile Organic Compounds

Benzene

Semivolatile Organic Compounds

Acenaphthene
Acetophenone
Anthracene
Benzo(a)anthracene
Benzo(a)pyrene
Benzo(b)fluoranthene
Benzo(k)fluoranthene
Carbazole
Chrysene
Dibenzo(a,h)anthracene
Dibenzofuran
Fluorene
Fluoranthene
Indeno(1,2,3-cd)pyrene
2-Methylnaphthalene
Naphthalene
Pyrene

Pesticides/PCBs

Dieldrin
Alpha-BHC
PCB aroclor-1254

Metals

Antimony
Arsenic
Barium
Cadmium
Chromium
Lead
Manganese
Iron
Thallium
Selenium
Silver
Zinc

These compounds/analytes were selected as COC as they were detected above either PADEP Act 2 MSCs or USEPA RBCs/SSLs in the samples collected from the CSFA. These COC will be included and evaluated as part of the FRA. If additional COC are identified in the post-excavation samples, they will be added to the list. Also, EPA has previously approved background concentrations for other portions of the Crater site for the metals arsenic, chromium, manganese and iron. If these metals are not detected above their approved background concentration range in the post-excavation samples they will not be evaluated in the FRA.

Exposure Assessment

The exposure assessment evaluates the likelihood, magnitude and frequency of exposure to the COC, and identifies pathways and routes by which human receptors may come into contact with these constituents. The specific steps involved in the exposure assessment include the following:

- Identification of potentially exposed populations
- Identification of media of concern
- Identification of actual and potential exposure route
- Establishment of exposure parameters
- Estimation of exposure doses

LPT's 2301 Renaissance Boulevard Property is currently being developed for Commercial Use as an office building. Also, upon completion of the remedial activities, the excavated portion of the CSFA will be located at least 2 feet below the finished construction grade. Based on this, the only receptor to be included in this FRA will be adult construction workers. This is the receptor

that was evaluated for subsurface soil in the Risk Assessment completed for the Crater Resources Superfund site.

The assessment will include both Reasonable Maximum Exposure (RME) and Central Tendency Exposure (CTE). The RME will be based on the maximum detected amount of the COCs, or the 95 % UCL, whichever is lower. The CTE will be based on the average concentration of the COC and modified exposure assumptions as developed in the Crater Resources Risk Assessment.

The identified media of concern is limited to subsurface soil because the remediated portion of the CSFA will be located at least 2 feet below the finished construction grade. The exposure pathways to be evaluated in the FRA will include oral ingestion, dermal exposure and inhalation of fugitive dusts.

The various exposure assumptions will be essentially identical to the assumptions used in the Crater Resources Risk Assessment. These exposure assumptions are presented below:

Exposure Pathways	Assumptions			
	Parameter	Units	RME	CTE
Ingestion				
	Ingestion rate Soil (IR-S)	Mg/day	480	200
	Exposure Frequency (EF)	Days/year	156	78
	Exposure Duration (ED)	Years	1	1
	Fraction Ingested (FI)	-	1	1
Dermal Absorption				
	Adherence Factor (SMAFBP)	Mg/event	319	319
	Event Frequency	Events/day	1	1
	Exposure Frequency (EF)	Days/Year	156	78
	Exposure Duration (ED)	Years	1	1
Inhalation				
	Inhalation Rate (IN)	M ³ /Hr	3.3	2.5
	Exposure Time (ET)	Hr/Day	8	8
	Exposure	Days/Year	156	78

	Frequency (EF)			
	Exposure Duration (ED)	Years	1	1
General				
	Body Weight (BW)	Kg	70	70
	Averaging Time (Cancer)	Days	25550	25550
	Averaging Time (non-Cancer)	Days	365	365

Toxicity Assessment

The toxicity criteria and information that relates constituent exposure (dose) to anticipated health effects (response) for each COC will be developed as part of the Toxicity Assessment. Toxicity criteria derived from dose-response data will be used in the Risk Characterization to estimate the carcinogenic and non-carcinogenic risks associated with exposure to the COCs.

Toxicity criteria used in this FRA will be obtained from USEPA's Integrated Risk Information System (IRIS) on-line database and other appropriate USEPA guidance documents. Toxicity criteria will be obtained from the following sources, listed in Descending order of use:

- IRIS (U. S. EPA, 2000)
- Health Effects Assessment Summary Tables (HEAST) (U. S. EPA, 1997)
- USEPA's National Center for Environmental Assessment (NCEA) as indicated in U. S. EPA Region III (2000)

The toxicity values used in these assessments (i.e., oral [CSFo] and inhalation [CSFi] cancer slope factors used to evaluate carcinogenic risk and oral [RfDo] and inhalation [RfDi] chronic reference doses used to evaluate noncarcinogenic risks) will be to those used in the Crater Resources Risk Assessment unless that data has been updated. Available inhalation unit risk factors will be converted into inhalation slope factors and inhalation reference concentrations will be converted into inhalation reference doses in accordance with USEPA guidance. It is expected that the same toxicity values that were used in the Crater Resource Risk Assessment will be used in this FRA, unless updated values become available.

Risk Characterization

In the final step of the risk assessment, the results of the exposure assessment (i.e., the calculated intakes) will be integrated with toxicity information, using USEPA's current approach, to derive quantitative estimates of potential risk associated with the defined exposure scenarios. Risk estimates are calculated following the standard procedures defined in USEPA's Risk Assessment Guidance for Superfund/Part A (U.S. EPA, 1989) and the results will be compared to levels of acceptable risk defined by USEPA (U.S. EPA, 1990).

Carcinogenic risk will be calculated for each COC as a product of the constituent intake and the chemical-specific carcinogenic slope factor. Under each defined scenario estimated risks for each carcinogenic constituent is summed to derive a total risk associated with a specific route of exposure (e.g., inhalation). The cumulative risk associated with all carcinogenic constituents and all routes of exposure will be calculated. The resulting risk will be compared to acceptable levels of risk defined by USEPA (1990) in the National Oil and Hazardous Substances Pollution Contingency Plan (i.e., 1×10^{-6} to 1×10^{-4}).

Non-carcinogenic hazard will also be calculated for each COC according to the methods described in Risk Assessment Guidance for Superfund/Part A (USEPA, 1989). A hazard quotient will be computed for each constituent by determining the ratio of the calculated chemical intake to the appropriate reference dose. Hazard indices (HI) will then be calculated as the sum of all appropriate hazard quotients, to fully evaluate the potential non-carcinogenic hazard associated with a defined exposure. If necessary, hazard indices will be segregated according to target organ effect to more accurately assess the potential for adverse health effects to occur as a result of the defined conditions of exposure. The non-carcinogenic hazard indices (Organ Specific) will be compared to EPA's acceptable level of 1.0. Any HI less than unity will be deemed acceptable, and any HI in excess of unity represents the potential for human adverse health effects.

Analysis of Results

If, upon completion of the FRA, the cumulative carcinogenic risks and non-carcinogenic hazard indices are less than USEPA's risk range (i.e., a carcinogenic risk of 1×10^{-6} to 1×10^{-4} , or hazard indices of 1.0) then no further action will be required for the CSFA. The CSFA will then be backfilled as described earlier. The analysis of the results of the FRA will be based on CTE.

If the cumulative risk is outside the risk range, then the samples with the major contribution to the risk will be identified. Once identified, additional excavation of soil in the areas represented by these samples, as discussed in Section 4.2.3, will be implemented. Upon completion of the additional excavation, post-excavation samples will be collected from the re-excavated areas following the procedures discussed in Section 4.2.3. The FRA, as described above, will then be implemented using the new post-excavation sample results to assure that the cumulative risk for the entire area is less than USEPA's risk range.

As indicated above, the only and most appropriate exposure pathway to be included in the FRA is an adult construction worker. If this is the only pathway evaluated, institutional controls associated with the future use of this portion of the property will be evaluated. If institutional controls are determined to be required, they will be submitted to EPA for review and approval, and will be outlined in the Remedial Action Report.

Liberty will evaluate impacts to ground water using the post-excavation soil sample results. This evaluation will follow appropriate EPA guidance but will incorporate site-specific conditions that Liberty believes eliminates the potential for contaminants to impact ground water. These

site specific conditions include: 1) the source area will have been removed; 2) the water table in this area is located over 70 feet below the ground surface; and 3) this portion of the site will be developed with an asphalt parking lot/concrete parking garage that will significantly reduce infiltration through the former CSFA.

**EROSION AND SEDIMENT CONTROL PLAN
FOR THE CINDER/SLAG FILL AREA
2301 RENAISSANCE BOULEVARD
UPPER MERION TOWNSHIP, PENNSYLVANIA**

1. **Name of Responsible Individual:** Michael A. Christie, P.G.

Address: 2755 Bergey Road, Hatfield, PA 19440

Phone Number: (215) 997-9000
2. **Project is Located in what Municipality:** Upper Merion Township
3. **Has The Municipality Been Contacted:** X Yes ___ No
4. **Tax Parcel #:** Unknown
5. **Name of Development:** 2301 Renaissance Boulevard
6. **Provide Written Directions for Locating Project Site:** Take Route 202 north from the King of Prussia area to Henderson Road. Make a right onto Henderson Road and proceed to Church Street. Make a left onto Church Street and follow to Horizon Drive. Make a right onto Horizon Drive and proceed to Renaissance Boulevard. Make a right on Renaissance Boulevard and the site is immediately on the left.

I. GENERAL INFORMATION ON PROJECT

A. Briefly describe project and extent of earthmoving:

The property located at 2301 Renaissance Boulevard is currently being developed as a commercial office building and associated parking areas. The property has been graded in preparation of construction activities and a storm water control system has been installed in accordance with an approved Storm Water Management Plan for the property.

The proposed work area, identified as the Cinder and Slag Fill Area (CSFA), occupies an area measuring approximately 240 feet by 125 feet or 0.7 acres in the northwest quadrant of the 2301 property (see Figure 4B-1). The CSFA consists primarily of glass, ash, cinders, coal dust and slag. The thickness of the fill ranges from 1-foot along the perimeter of the CSFA up to 12 feet in the central portion of the CSFA. The CSFA is being remediated in accordance with the document entitled "Remedial Design/Remedial Action Work Plan for the Cinder/Slag Fill Area".

As part of the remedial activity, the fill material within the CFSA will be excavated using a dozer/track-loader and an excavator. The dozer will be used to push the fill to the southeast corner of the work area where the excavator will be located. The dozer will start at the western and northern ends of the work area and will slowly push the fill, which will be removed in lifts, towards the excavator. The excavator will then be used to load the fill material directly into DOT-approved tri-axle dump trucks for off-site disposal. If required, a water truck will be used to wet down the fill material being excavated/loaded to reduce the generation of dust.

Following completion of the excavation activities, and upon verification of the effectiveness of the remedial activities, the work area will be backfilled with clean soil as required to meet current construction plans. The backfill will be rolled and compacted in accordance with the site construction plans. As part of the development of the site, a concrete parking garage will be immediately constructed over the former CFSA.

Access to the work area will be via an existing construction entrance for the 2301 property located in the northeast portion of the site at the approximate location shown on Figure 4B-1. The construction entrance is located at the southeast end of an asphalt driveway that is used to access the site from Renaissance Boulevard and Horizon Drive. This entrance was installed as part of the on-going site construction activities and is about 40 feet long by 40 feet wide and consists of 6-inches of riprap. During the remedial activities, heavy equipment and the trucks used to transport the fill from the CSFA to the landfill will use this construction entrance to enter and exit the site. Prior to the initiation of the remedial activities, 6-inches of additional riprap will be placed over the construction entrance. The construction entrance will be maintained throughout the duration of the excavation and backfilling activities.

The construction entrance will be connected to the CSFA via an existing, temporary dirt access road. The location of the temporary dirt access road is shown on Figure 4B-1. This access road is flat and is currently being used to access other portions of the site. This road will be sufficient to allow access to the CSFA and will be used by all equipment and trucks entering/leaving the CSFA area. This road will be routinely sprayed with water to eliminate dust generated by trucks/equipment using this road to access the CSFA.

The temporary dirt access road will terminate at the truck loading and turnaround area to be constructed immediately adjacent to the southeast corner of the CSFA as shown on Figure 4B-1. The truck loading and turnaround area will be constructed of 6 to 8-inches of riprap and will be about 120 feet long by 60 feet wide. This area will provide a sufficient amount of room to load out the trucks and then allow them to turnaround and leave the area via the dirt access road. Although no trucks used to haul the fill to the landfill will be allowed to enter the CSFA, a truck tire-wash/decontamination pad will be constructed within and at

the southeast corner of the truck loading and turnaround area. This pad will be used, if required, to wash the tires of any trucks, which may have inadvertently entered the CSFA prior to them leaving the loading and turnaround area. Also, all heavy equipment used within the CSFA will be decontaminated on this pad prior to the equipment being allowed to leave the site. The decontamination pad will be about 25 feet long by 15 feet wide.

The area over which the truck tire-wash/decontamination pad will be placed will be excavated to a depth of 12-inches. This area will then be lined with a layer of 12-mil plastic. A sump will be excavated in one corner of the pad and a metal drum will be placed within the sump. The drum/sump will be lined with 12-mil plastic. The pad will be constructed and sloped such that water that collects on the pad will drain towards and into the drum/sump. After the plastic has been installed, a 3-inch layer of sand will be placed on top of the plastic, which will then be covered by 9-inches of riprap. All trucks, which leave the CSFA, will be required to drive onto the decontamination pad. The trucks will then be visually inspected to make sure that there is not dirt or mud on the tires of the truck. If required, the tires of the trucks will be rinsed prior to leaving the loading and turnaround area.

As indicated above, all trucks will leave the property via the construction entrance. A final inspection of each truck that leaves the CSFA will be completed at the construction entrance. If any dirt is visible on the wheels of the trucks the tires will be sprayed down with water so that this dirt is not tracked off the site.

In an effort to reduce the generation of dust as much as possible, the fill material will be excavated and moved slowly. Also, during the on-site excavation activities water will be used to wet down the fill material being excavated/loaded to reduce the generation of dust. If required, the temporary access road, connecting the truck loading/turnaround area to the construction entrance, will be wet down as well. The asphalt driveway leading from the construction entrance to Renaissance Boulevard and Horizon Drive will be cleaned each day with a wet-street sweeper.

B. Estimated Start and Completion Dates:

START: August 2001 END: October 2001

C. Name of Nearest Receiving Stream: Matsunk Creek

D. Have Wetlands Been Delineated: X Yes _____ No

E. Soil Information:

(1) Soil Type: Beltsville (BIB2) and fill material

(2) Is the Soil Hydric: ____ Yes X No

- (3) Limitations: Beltsville soil is not suitable for winter grading or for topsoil. Beltsville soil has a low permeability, is slightly acidic and experiences high seasonal water tables.

II. STORMWATER RUNOFF AND DRAINAGE

- A. Are steep slopes in excess of 10% of the project or the immediate surrounding areas? ☐ Yes ☒ No
- B. Off-site runoff onto the project site must be controlled. Does off-site drainage exist? ☒ Yes ☐ No

As previously indicated, the site is currently being developed for commercial use as an office building. As part of these approved development activities, a Storm Water Management Plan was developed and approved for the site. The requirements of this Storm Water Management Plan have been implemented. As a result, storm water flow onto and off of the site is controlled as required by the Montgomery County Conservation District and the PADEP.

Storm water run-off into the CSFA will be controlled by the existing storm water controls already installed at the site and through the installation of a temporary drainage swale along the upgradient perimeter of the work area (see Figure 4B-1). The swale will divert storm water run-off around and away from the CSFA, thereby limiting the accumulation of water within the excavation during precipitation events. Diverted run-off will be conveyed away from the CSFA to adjacent areas for infiltration or transportation via overland flow to existing on-site storm water inlets/drainage swales. The drainage swale will be constructed in accordance with applicable guidelines (see Appendix A) and will be graded to ensure that stormwater is diverted away from the work area. A rock apron outlet will be installed at the terminus of the swale to filter the water and reduce the outlet velocity of water. The rock aprons will be installed as detailed in Appendix A.

As an additional, secondary control measure, an earthen berm will be installed along the upgradient perimeter of the CSFA. If installed, the berm will be located immediately adjacent to the swale, on the downgradient side, and will prevent run-off from entering the excavation during periods of peak run-off. The berm will be constructed of clean fill material to an approximate height of one foot above the ground surface.

A 21,000-gallon temporary aboveground storage tank will be mobilized to the Site. Any water that accumulates in the CSFA that does not naturally infiltrate into the ground will be pumped into this tank. This water will then be sprayed onto the fill material in the CSFA for dust suppression purposes. Any water that

can not be utilized for dust suppression purposes will be characterized for off-site disposal.

- C. Will the project increase run-off velocities or channelize stormwater run-off? ☐ Yes ☒ No

III. SEQUENCE OF ACTIVITIES

1. Reinforce construction entrance and prepare access road.
2. Install the truck turn-around/loading area and the decontamination pad.
3. Install erosion, sediment and storm water controls as discussed in this Plan and as shown on Figure 4B-1.
4. Mobilize dozer and excavator to the northwestern end of the work area and commence excavation activities
5. The fill material will be removed in sequential lifts, moving in a southeasterly direction towards the load-out area. The fill material will be immediately loaded onto trucks for off-site disposal.
6. The silt fencing and/or straw bale barriers will be inspected daily and any accumulation of silt removed per the attached requirements.
8. Upon completion of the excavation activities, the work area will be backfilled with clean fill, compacted and graded as per the approved construction plans.
9. Following backfilling and grading activities, a concrete parking garage will be constructed over the former CFSA, per the approved construction plans. All erosion and sedimentation control devices will then be removed.

IV. TEMPORARY EROSION AND SEDIMENTATION CONTROLS

A. Check if Applicable

- | | |
|--|--|
| <input checked="" type="checkbox"/> Straw Bale Barrier | <input type="checkbox"/> Sediment Trap |
| <input checked="" type="checkbox"/> Filter Fabric | <input checked="" type="checkbox"/> Rock Const. Entrance |
| <input checked="" type="checkbox"/> Temporary Swale | <input checked="" type="checkbox"/> Mulching/Seeding |
| <input type="checkbox"/> Rock Filters | <input checked="" type="checkbox"/> Other |

List Other Controls: Earthen berm, slope grading and stabilization

Erosion and sedimentation generated from the earthmoving/excavation activities for this project will be controlled using methods designed to minimize and/or detain sediment-laden runoff from the work area prior to its release to undisturbed areas or nearby wetland areas. The primary controls will be silt fencing and/or hay bale barriers and a sequenced excavation program. The silt fence/hay bale barriers will be installed along the downgradient side of the CSFA at the approximate location shown on Figure 4B-1. The silt fence/hay bale barriers will be installed following the specific actions included in Appendix A. Secondary controls will include a single construction entrance, temporary seeding and mulching, if required, and appropriate grading and slope stabilization techniques (i.e., maintaining a maximum slope of 8% within the excavation area). Prior to the initiation of any excavation activities, all required erosion and sedimentation control devices will be installed in accordance with this Plan and as shown on Figure 4B-1.

B. Check if Applicable

☒ All items checked above will be to the specifications of the document entitled "Erosion and Sedimentation Control Plan Guide for Small Projects", developed by the Southeast Pennsylvania Association of Conservation Districts (SPACD). The appropriate specifications for each control are provided in Appendix A.

☐ Alternative controls and/or specifications are proposed.

V. PERMANENT CONTROLS

A. Check if Applicable

☐ Permanent vegetation will be established per SPACD recommendations.

☐ Alternative specifications have been developed for re-vegetation.

☒ Other permanent controls have been developed for this project, as described below.

B. Describe Other Controls:

As part of the development of the site, a concrete parking garage will be constructed over the former CFSA immediately upon completion of the excavation/backfilling activities. Temporary seeding/mulching will be placed over the work area, as needed, pending completion of the construction of the garage.

VI. MAINTENANCE PROGRAM

A. Required Measures:

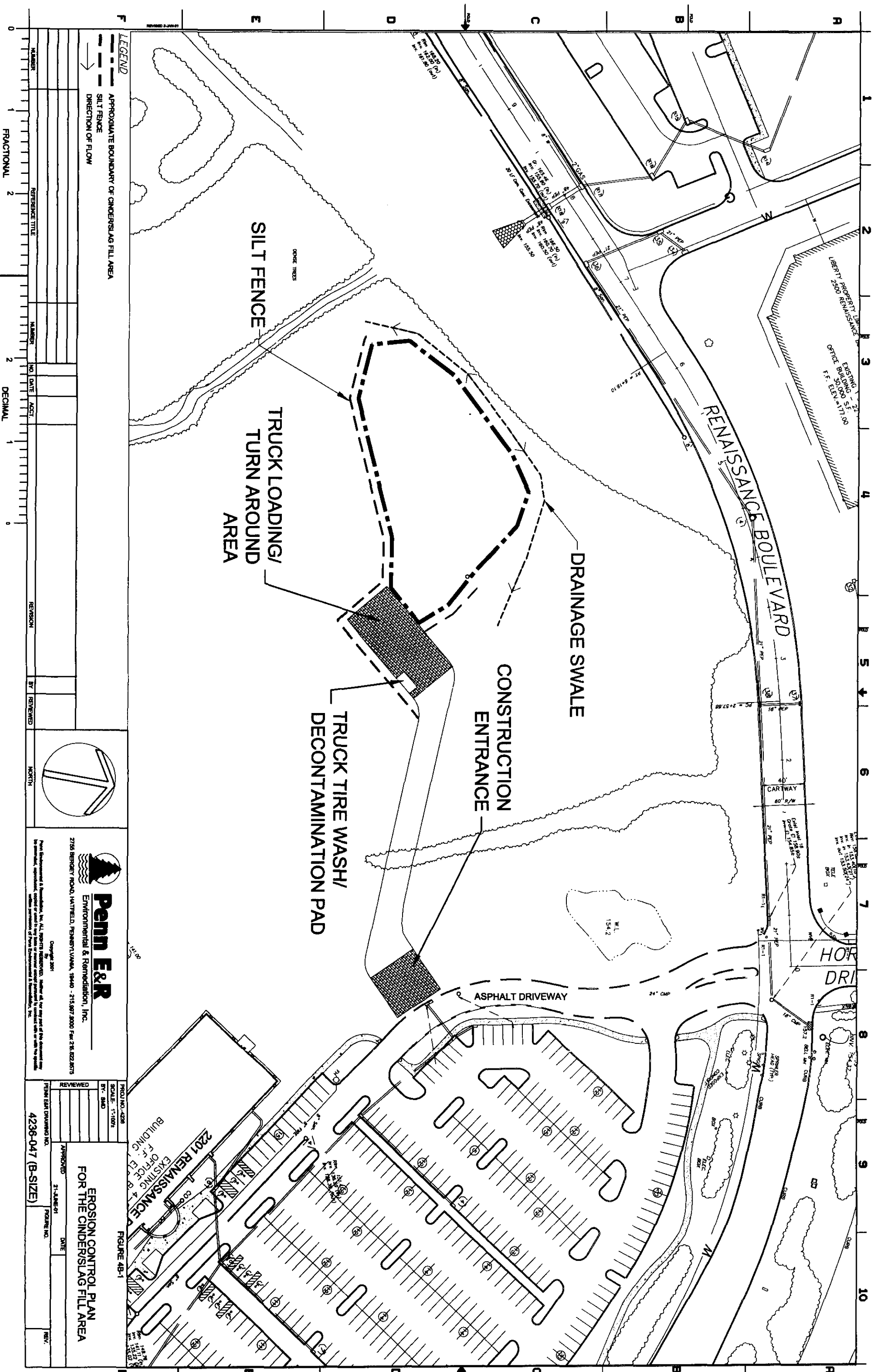
1. Until the site is stabilized, all erosion and sedimentation controls will be maintained properly. Maintenance will include inspections of all erosion and sedimentation controls after each storm event or on a daily basis. All preventative and remedial maintenance work, including clean out, repair, replacement, remulching and renetting will be performed immediately.
2. Should any measures contained within this plan prove incapable of adequately removing sediment from on-site flows prior to discharge or of stabilizing the surfaces involved, additional measures will be immediately implemented to eliminate all such problems.
3. After final site stabilization has been achieved, temporary erosion and sedimentation controls will be removed. Areas disturbed during removal of the controls will be stabilized through mulching and seeding.

B. Check if Applicable:

- ☒ Sediment must be removed where accumulations reach $\frac{1}{2}$ the above ground height of silt fencing.
- ☒ Sediment must be removed where accumulations reach $\frac{1}{3}$ the above ground height of straw bale barriers.
- ☐ Stormwater inlets must be protected until the tributary areas are stabilized and control measures maintained after each storm event.
- ☐ Sediment must be removed from traps when storage capacities are reduced to 1,300 cubic feet per tributary acre.
- ☐ Sediment traps must be protected from unauthorized acts of third parties.

VII. EROSION CONTROL PLAN

Attached Figure 4B-1 shows the location of the CFSA and all erosion, sedimentation and storm water control devices that will be implemented as part of this project.



SECTION 5.0

**SAMPLING AND ANALYSIS PLAN
FOR THE CINDER/SLAG FILL AREA LOCATED
ON LPT'S 2301 RENAISSANCE BOULEVARD PROPERTY**

Prepared by:



Michael A. Christie, P.G.
Project Manager
Penn E&R, Inc.

10/10/01
Date

Approved by:

Joseph McDowell
Remedial Project Manager
USEPA, Region III

Date

5.0 SAMPLING AND ANALYSIS PLAN

This Sampling and Analysis Plan consists of a Field sampling Plan (FSP) and a Quality Assurance Project Plan (QAPP). The FSP provides the procedures that will be followed during all field sampling and data-gathering activities and the QAPP describes the policy, organization, functional activities, and quality assurance and quality control measures necessary to achieve the data quality objectives identified for the site. The components of these two plans are presented below.

5.1 Background Information

The location of the CSFA is shown on Figure 5-1. The material in the CSFA consists primarily of glass, ash, cinders, coal dust and slag. As shown on Figure 5-1, the surface expression of the CSFA encompasses an area, on average, about 240 feet long by 125 feet wide. The thickness of the fill ranges from 1-foot along the perimeter of the area to up to 12 feet in the central portion of the CSFA. However, the fill material is, on average, from 3 to 4 feet thick. There is approximately 4,000 cubic yards of fill located in this area. The proposed remedy for this area is the excavation and off-site disposal of the fill from the CSFA. To verify the effectiveness of these remedial activities, post-excavation soil samples will be collected. The area will be backfilled upon confirmation that all post-excavation soil samples meet applicable cleanup standards.

5.2 Proposed Remedy

The proposed remedy for the CSFA is to excavate the material, load it into DOT approved trucks, and transport it off-site for disposal. As discussed in Section 2.0 (Site Characterization Activities) and to be detailed in Section 7.0 (Site Management Plan), the material in the CSFA has been previously characterized and accepted for disposal at Waste Management's Pottstown, PA landfill. Therefore, all material removed from the CSFA will be transported under manifest to Waste Management's Pottstown, PA landfill.

Upon completion of the removal activities, post-excavation samples will be collected and analyzed in accordance with Sections 4.2.3 and 5.3. As discussed in Section 4.3, a Focused Risk Assessment (FRA) will be implemented using the results of the post-excavation samples to demonstrate that soils remaining in the CSFA after completion of the remedial activities do not present an unacceptable risk to human health or the environment. If, upon completion of the FRA, the cumulative carcinogenic risks and non-carcinogenic hazard indices are within USEPA's risk range, then no further action will be required and the CSFA will be backfilled. If the cumulative risk is outside the risk range, then the samples with the major contribution to the risk will be identified. Once identified, additional excavation of soil in the areas represented by these samples will be implemented in accordance with Section 4.2.2. Additional post-excavation samples will then be collected from the newly excavated areas and analyzed for the COC. The FRA will then be implemented using the new post-excavation sample results to assure that the cumulative risk for the entire area is within USEPA's Risk range. Upon completion of the FRA and confirmation that soils remaining in the CSFA do not present an unacceptable risk, a Remedial Action Report, as outlined in Section 13, will be developed and submitted for review.

The proposed remedial action for the CSFA will meet the Remedial Action Objectives for soils outlined in Section VIII of the ROD. That is, the excavation and off-site disposal of the material in the CSFA will: 1) eliminate exposure to soil which presents an unacceptable risk to human health or the environment; and 2) prevent contact of soil constituents with other media such as ground water and surface water which may transport the contamination so that the transport does not create an unacceptable risk to human health or the environment. Further, the proposed remedial action for the CSFA will meet the applicable Performance Standards outlined in Section XII of the ROD. These Performance Standards and how they will be met were listed and discussed in detail in Section 4.1. Finally, the remedy selected for the CSFA meets the Statutory Determinations of Section XIII of the ROD. That is, the remedy is protective of human health and the environment, will comply with all applicable or relevant and appropriate requirements, provides the best overall protection in proportion to cost, and utilizes a permanent solution. Treatment of the fill was not selected due to the communities' preference for removal of the source area.

A detailed discussion of the proposed remedy and how it will be implemented was provided in Section 4.0.

5.3 Field Sampling Plan

This Field Sampling Plan outlines the procedures which will be followed during all on-site sampling activities. The only sampling currently anticipated to be required as part of the implementation of the proposed remedial activity for the cinder/slag fill area (CSFA) is post-excavation soil sampling.

5.3.1 Sampling Objective

The objectives of the post-excavation sampling is to confirm that all potentially impacted material has been removed and that soils remaining in the CSFA after completion of the remedial activities do not present an unacceptable risk to human health or the environment.

5.3.2 Post-Excavation Sample Location and Frequency

To verify the effectiveness of the remedial activities, post-excavation soil samples will be collected from the CSFA. One post-excavation soil sample will be collected per 50 feet of excavation sidewall and one sample will be collected from the bottom of the excavation per 900 square feet (i.e., 30 foot by 30 foot) of area excavated. Based on the current dimension of the CSFA, this sampling approach will result in the collection of fourteen soil samples from the excavation sidewalls and thirty-three from the bottom of the excavation for a total of forty-eight soil samples. This sampling approach also meets and exceeds the requirements of Pennsylvania's Land Recycling and Environmental Remediation Standards Act (Act 2), which requires the collection of twelve post-excavation samples per 3000 cubic yards of soil removed.

The sidewall samples will be collected at 50-foot centers around the perimeter of the excavation. The samples will be collected from the mid-point of the sidewall. That is, if the sidewall is 3 feet

high at the selected location, the post-excavation sample will be collected from a depth of 1.5 feet below the ground surface (BGS). The samples from the bottom of the excavation will be collected by establishing a 30-foot by 30-foot grid over the CSFA. One sample will then be collected from the center of each of the individual grids from the bottom of the excavation. The samples will consist of soil from 0 to 6-inches into the face of the sidewall or from 0 to 6-inches below the bottom of the excavation. Figure 5-2 shows the location at which the post-excavation soil samples will be collected from the cinder/slag fill area. These locations may be modified in the field depending on the final dimensions and layout of the excavated area.

The horizontal location of each post-excavation soil sample will be surveyed and included on site maps included in the Remedial Action Report. Sample collection depths will be determined using a tape measure and existing grade elevations as a reference point.

5.3.3 Quality Assurance/Quality Control Samples

The quality assurance/quality control (QA/QC) samples that will be collected as part of the remediation of the CSFA are presented and discussed in Section 5.4.9 of the Quality Assurance Project Plan.

5.3.4 Sample Designation

Each sample collected as part of the remediation of the CSFA will be assigned its own unique sample identification number. Samples will be labeled using a five-part code as follows:

CSFA-072701-PE1-S-0.5

1. Name of Area: Cinder/Slag Fill Area (CSFA)
2. Date of Collection: July 27, 2001 (072701)
3. Location of Sample: Post-Excavation Sample Number 1 (PE1). The environmental and blind duplicate samples will be numbered consecutively in the order that they were collected starting with the number 1. The locations from which the blind duplicates are collected will be recorded in the field book. Matrix spikes and matrix spike duplicates will be provided the same number that was given to the post-excavation sample location from which these samples were collected but the number will be preceded by the prefix MS for matrix spikes and MSD for matrix spike duplicates. As an example, the matrix spike and matrix spike duplicate generated at Post-Excavation sample location #2 would be designated MS2 and MSD2, respectively. The equipment rinsate and trip blanks will also be numbered consecutively starting with 1 but each number will be preceded by the associated prefix that indicates the sample type (i.e., ERB2 for the second equipment rinsate blank collected during the remedial activities and TB3 for the third trip blank generated during the remedial activities).
4. Matrix: S for soil and W for water.

5. Collection Depth: This is the depth at which the sample was collected from beneath the ground surface for sidewall samples or the floor of the excavation for samples collected from the bottom of the excavation. The designation for equipment rinsate and trip blanks will only consist of three segments as sample collection depths are not relevant for these QA/QC samples.

5.3.5 Field Screening

Each post-excavation soil sample location and surrounding areas will be visually inspected for signs of contamination. Also, the soils at each location will be screened for volatile organic vapors with a photoionization detector (PID). A 10.6 eV bulb will be used in the PID.

5.3.6 Laboratory Analyses

Each post-excavation soil sample will be analyzed for the compounds of concern as identified during the previous site characterization activities. As discussed in Section 2.0, these compounds of concern include the volatile organic compound benzene; the semivolatile organic compounds acenaphthlene, acetophenone, anthracene, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, carbazole, chrysene, dibenzo(a,h)anthracene, dibenzofuran, fluorene, fluoranthene, indeno(1,2,3-cd)pyrene, 2-methylnaphthalene, naphthalene, pyrene; the pesticides dieldrin and alpha-BHC; the PCB aroclor-1254; and the metals antimony, arsenic, barium, cadmium, chromium, lead, manganese, iron, selenium, silver, thallium and zinc. The blind duplicates, equipment rinsate blanks, and matrix spike/spike duplicates to be collected as part of the post-excavation sampling activities will be analyzed for the aforementioned compounds of concern. The trip blanks will be analyzed for benzene only. The samples will be analyzed by CompuChem, an EPA approved CLP laboratory located in Cary, NC. The volatile and semivolatile organic analyses will be performed using USEPA Method OLM04.2 (GC/MS) and the metal analyses will be performed using USEPA Method ILM04.1 (ICP).

The air samples to be collected during the remedial activities, as discussed in Section 6.6 of this RD/RAWP, will be analyzed for total dust and lead. These samples will be analyzed by Philip Analytical Services, an American Industrial Hygiene Association accredited laboratory, using NIOSH Methods 7300 for lead and 0500 for dust.

The analyses to be completed on the samples, including required analytical methodologies, are summarized in Table 5-1. Also, the analytical method detection limits and the reporting limits for the various compounds/analytes to be tested for are presented in Section 3.6.3 of CompuChem's Quality Assurance Manual (see Attachment 5D).

5.3.7 Sampling Equipment and Procedures

The effectiveness of the remedial activities implemented in the CSFA will be verified through the collection and analysis of post-excavation soil samples. No other environmental samples (i.e., ground water and/or surface water samples) will be collected as part of the remedial activities. This Section of the FSP describes the procedures that will be followed during the collection of the post-excavation soil samples.

Prior to the collection of the individual post-excavation samples, plastic sheeting will be placed on the ground adjacent to the sample location. Any equipment used during the sampling activities will be placed on the plastic sheeting. The sample technician will then don nitrile gloves to limit any possible chance for cross-contamination, and the sampling, as described below, will be implemented.

The volatile organic fraction at each sample location will be collected first. At each sample location, the first two-inches of material will be removed to provide a fresh sampling surface. A dedicated Encore™ sampler will then be used to collect the volatile organic fraction of the post-excavation sample. After removing the sampler from its bag, its sample handle will be installed. The Encore™ sampler will then be slowly pushed into the surface of the area to be sampled. After ensuring that the sampler is full, but not overfilled to prevent the cap from being properly secured, the sampler will be removed and capped. Any soil on the outside of the sampler will be wiped off using paper towels. A filled out label will be placed on the sampler and the sampler will be placed back into its laboratory supplied zip-lock bag. The label on the outside of the bag will be completed and the bag will be placed on ice in a cooler. As summarized in Table 5-1, all samples will be kept at 4° C, and three 5-gram samplers will be collected at each location for volatile organic analysis.

After collecting the volatile organic fraction of the sample, a decontaminated hand-held stainless steel bucket auger and/or trowel will then be used to collect a sufficient volume of soil to complete the remaining analyses. The soil from the bucket auger/trowel will be transferred directly into a stainless steel mixing bowl using a stainless steel spoon or spatula. The soil in the mixing bowl will then be thoroughly homogenized using a stainless steel spoon. After homogenization, the required laboratory supplied sample bottles will be filled. The required volume of soil, as summarized in Table 5-1, will be placed in each jar. The sample jars will then be labeled and placed into a cooler with ice. All samples will be kept at 4° C.

The following is a list of equipment that will be available during the post-excavation sample collection activities:

- Remedial Design/Remedial Action Work Plan
- Laboratory supplied sample containers and cooler with ice and/or ice packs
- Chain-of-custody labels, tags and seals
- Surgical gloves
- Decontamination equipment including buckets, brushes, tap water, soap and water mixture, pesticide grade acetone, dilute nitric acid solution, and deionized water
- Sampling devices including Encore™ samplers, stainless steel bucket augers, stainless steel trowels and spoons, and stainless steel mixing bowls.
- Field book and indelible ink markers to record all sampling activities
- Site map to mark and identify sample locations

Other equipment as may be required to complete the sampling will be provided.

5.3.8 Sample Documentation, Handling and Shipment

The sample documentation procedures that will be implemented to ensure that proper chain-of-custody is maintained are discussed below.

Field Book

All soil sampling activities associated with the sample collection activities will be maintained in a bound field log book. All relevant information associated with the sample collection activities will be maintained in the field book. At a minimum, the following information will be maintained in the field log book:

- Date and time of sampling
- Persons completing the sampling
- Weather conditions at the time the samples were collected
- Results of field screening observations
- Sample designation and analyses requested to be completed
- Decontamination procedures implemented
- Type of equipment used to collect the samples
- Number of laboratory bottles collected and submitted for each location
- Sample collection depths and locations
- Quality assurance/quality control samples collected
- The location and designation of any blind duplicate samples collected
- Any unusual conditions observed during the sample collection activities

Sample Tags

A self-adhesive sample label will be attached to each container immediately prior to or after sample collection. The sample tags will contain the following information

- Project name
- Sample collection date and time
- Sample designation
- Sampler(s) name
- Preservatives present in the sample bottle
- Analyses requested
- Sample media and an indication of whether the sample is a grab or composite
- Initials of the sampler(s)

A copy of the CompuChem sample tags that will be used for the post-excavation sampling activities is provided in Attachment 5A. The sample tags will be filled out using waterproof, non-eraseable black ink.

Chain-of Custody Record

Chain-of-custody is the process of tracking the handling of the sample from time of collection to analysis. A sample is under custody if it is in: 1) one's possession; 2) one's view after being in one's possession; 3) one's possession and stored in a secured area; and/or 4) a designated secure area. To ensure that proper custody of the samples collected during these remedial activities is maintained at all times, a chain-of-custody (COC) record will be completed by the Field Operations Manager for each shipment of samples to the laboratory. The completed COC will be sealed in a zip-lock bag and taped to the inside lid of the cooler. When samples are being transferred (i.e., from the field to the laboratory), each person involved in the transfer must sign off on the COC record.

A copy of the CompuChem COC record that will be used for the post-excavation sampling activities is provided in Attachment 5A. The COC record will be completed using waterproof, non-eraseable black ink.

Sample Preparation and Shipment

Prior to shipment, the sample tags on each bottle will be inspected to ensure that they have been properly completed and all information has been provided. Each sample container will then be placed in a zip-lock plastic bag and placed into a metal or molded plastic insulated cooler. The coolers will be packed with ice or dry ice to ensure that the temperature inside the cooler is maintained at 4 degrees Celsius during its trip back to the laboratory. The bottles will be packed in the cooler to minimize potential damage during shipping. Also, a thin layer of styrofoam peanuts will be placed on the bottom of the cooler and in the annulus between the bottles in an effort to further reduce any damage to the sample bottles during shipment.

The COC record will be placed in a sealed zip-lock bag and taped to the inside lid of the cooler. The cooler lid will be shut and fastened. Plastic shipping tape will be used to secure the drain and the lid. Two custody seals, one at each end of the cooler, will then be sealed to the cooler so that any tampering of the cooler (i.e., opening of the lid) can be documented by the laboratory. A copy of the CompuChem Custody Seal that will be used for the post-excavation sampling activities is provided in Attachment 5A.

All sample coolers will be shipped directly to the laboratory using an overnight express delivery service following all appropriate DOT regulations. Upon receipt, the laboratory will inspect the cooler to make sure that it has not been tampered with and will compare the COC record to the contents of the cooler. A laboratory control number will be assigned to the samples and the samples will be logged into the laboratory computer sample inventory and tracking system.

5.3.9 Decontamination Procedures

All non-disposable sampling equipment will be decontaminated in accordance with the following procedures prior to its use and between sample location.

- Manual scrub to remove all visible dirt and mud;

- Rinse with tap water
- Wash with a tap water and non-phosphate soap solution
- Rinse with tap water
- Rinse with deionized water
- Rinse with a dilute nitric acid solution
- Rinse with deionized water
- Rinse equipment with pesticide-grade acetone
- Allow equipment to air-dry

If the equipment is to be stored or transported, it will be wrapped in aluminum foil. All dirt and other material removed from the equipment will be disposed off-site with the material removed from the CSFA. The wash and rinse water generated during the decontamination activities will be containerized and sprayed over the fill material, which will be subsequently shipped off-site for disposal. The acetone rinse will be collected in a shallow aluminum pan and allowed to evaporate. All decontamination activities will be documented in the field log book.

5.4 Quality Assurance Project Plan

This Quality Assurance Project Plan (QAPP) outlines the data collection and environmental measurement procedures that will be implemented during the remediation of the cinder/slag fill area. The objective of this QAPP is to outline the quality assurance/quality control (QA/QC) procedures that will be followed during sample collection and analysis, data reduction, validation and evaluation activities.

5.4.1 Project Description

The project will include the excavation and off-site disposal of fill material present in the cinder/slag fill area (CSFA) and the collection of post-excavation soil samples to confirm the effectiveness of the remedial activities. The previous site characterization activities completed in the CSFA and the results of these activities were presented in Section 2.0 and the location and layout of the CSFA were described in Section 3.0. Section 4.0 includes a detailed description of the remedial activities to be implemented in the CSFA and the post-excavation sampling to be completed to verify the effectiveness of the remedial activities.

5.4.2 Project Organization and Responsibilities

The lead regulatory Agency for the site is USEPA Region III. Mr. Joseph McDowell is USEPA's Remedial Project Manager. PADEP will also provide technical oversight on this project.

Remedial Design/Remedial Action Contractor

Penn E&R is the Remedial Design/Remedial Action Contractor and will oversee the implementation of the remediation activities and will complete the post-excavation soil sampling. Penn E&R will also oversee and manage all other aspects of the project, including the coordination of all subcontractors, data analysis and evaluation, and will prepare the Remedial

Action Report discussed in Section 13. Penn E&R will also develop and submit all required progress reports to the USEPA/PADEP. Environmental Standards, located in Valley Forge, PA, will complete the data validation activities and CompuChem, a CLP-approved laboratory located in Cary, N.C, will be the project analytical laboratory. Both Environmental Standards and CompuChem will report directly to Penn E&R's Quality Assurance Officer. The key personnel assigned to this project by Penn E&R and Environmental Standards/CompuChem are discussed below.

Project Manager

To ensure that all project activities are completed in accordance with this Remedial Design/Remedial Action Work Plan, Michael A. Christie, P.G., Vice President, will function as Penn E&R's Project Manager. Mr. Christie will govern all work assignments and internal team resources to complete each task safely and efficiently. Mr. Christie will provide interface with the USEPA/PADEP, as required, and will review and approve all project deliverables. Mr. Christie has over fourteen years of professional experience in the management of remedial projects similar in scope to the activities to be implemented in the CSFA.

Field Operations Manager

All field operation tasks for Penn E&R will be managed by Jeffrey Goudsward. Mr. Goudsward has direct experience completing similar remediation projects and is very familiar with the site as he assisted with the remediation of soils along the former pipeline. He is familiar with the field sampling techniques and all appropriate health and safety protocols which will be required to ensure the successful completion of this project. Mr. Goudsward has ten years of related project experience. He will be on-site to oversee and document all remedial activities and will help ensure that they are implemented in accordance with the requirements of this RD/RAWP.

Corporate Health and Safety Officer

Christopher Branton, C.I.H., has ten years of experience in areas related to occupational health and safety and industrial hygiene. This experience includes managing projects regarding regulatory compliance, health effects and risk assessment, process safety management, and respiratory protection. Mr. Branton is Penn E&R's Corporate Health and Safety Officer. Along with the designated on-site Health and Safety Coordinator, Mr. Branton will be responsible for ensuring that all field activities are implemented in accordance with the Site-Specific Health and Safety Plan (see Section 6.0).

On-Site Health and Safety Coordinator

Mr. Thomas Christie will be Penn E&R's on-site health and safety coordinator. Mr. Thomas Christie has over 10 years of experience related to the implementation of similar remedial actions. He will be responsible for ensuring that all field activities are implemented in accordance with the Site-Specific Health and Safety Plan and for implementing all on-site monitoring to ensure that appropriate Action levels are not exceeded. Mr. Christie will also

assist the Field Operations Manager with the oversight of the remedial activities and collection of post-excavation soil samples.

Quality Assurance/Quality Control Officer

Mr. Jeffery Fehr, P.G., Senior Project Manager, will serve as the project Quality Assurance/Quality Control (QA/QC) Officer. He has been responsible for designing and conducting a variety of QA/QC services related to remedial activities. Mr. Fehr will be responsible for monitoring, reviewing, and approving all reports. He will provide critical review for all phases of the project, including the field sampling activities, and will be responsible for ensuring the procedures outlined in this QAPP are adhered to at all levels of the project. Mr. Fehr will coordinate and oversee the activities of Environmental Standards, the project's Data Validation Specialist and CompuChem, the project's CLP approved analytical laboratory.

Project Support Personnel

Penn E&R will assign appropriate support personnel to this project as may be required. Any additional personnel assigned to this project will be fully experienced in the remedial activities being implemented in the CSFA and other facets of the project.

A copy of a resume for each of the key Penn E&R personnel assigned to this project is included in Attachment 5B.

Data Validation Specialist

As indicated above, Environmental Standards, located in Valley Forge, PA will complete the data validation activities. ES is recognized as an industry leader in data validation and has completed the required validation activities on numerous similar projects. Mr. Donald Lancaster is one of Environmental Standards' most qualified and experienced chemists in the area of data validation and will serve as Data Validation Coordinator for the project. Mr. Lancaster's responsibilities will include tracking the analytical data deliverable receipt schedules to allow proper allocation of internal staff resources to this project. Mr. Lancaster will be responsible for matching the laboratory data deliverables with the project validation requirements based on work assignments and assigning staff to perform the validation efforts. Furthermore, he will be responsible for addressing data deliverable deficiencies with the laboratory based upon the validation requirements. He will track the progress of the various validation efforts to ensure compliance with delivery schedules to Penn E&R. Laboratory timeliness in response to data deliverable deficiencies will be tracked by Mr. Lancaster and the Penn E&R Quality Assurance Officer will be informed of any problems. Mr. Lancaster will report directly to the Penn E&R's Quality Assurance Officer.

A copy of Environmental Standard's Qualification and Experience Summary, along with a resume for Mr. Lancaster, is provided in Attachment 5C.

Analytical Laboratory

All laboratory analyses associated with this project will be completed by CompuChem, a CLP approved laboratory located in Cary, N.C. CompuChem's Quality Assurance Officer has the responsibility for ensuring that all laboratory quality assurance activities associated with this project are properly implemented. CompuChem's Quality Assurance Officer is Ms. Linda Carter. A copy of CompuChem's Quality Assurance Manual, along with a resume for Ms. Carter, is provided in Attachment 5D.

5.4.3 Quality Assurance Objectives for Measurements

Data Quality Objectives (DQOs) are quantitative and qualitative statements specifying the quality of the environmental data required to support the decision-making process. Penn E&R's Project Manager, in conjunction with the Quality Assurance Officer, is responsible for defining the DQOs. The intended use of data, analytical measurements, and the availability of resources are an integral part in development of the DQOs. DQOs define the total uncertainty in the data that is acceptable for each specific activity during sampling events. This uncertainty includes both sampling error and analytical instrument error. Ideally, the prospect of zero uncertainty is the intent; however, the variables associated with the collection process (field and laboratory) inherently contribute to the uncertainty of the data. The overall quality assurance objective is to keep the total uncertainty within an acceptable range that will not hinder the intended use of the data. In order to achieve this objective, specific data quality requirements, such as detection limits, criteria for accuracy and precision, sample representativeness, data comparability, and data completeness, will be specified. The overall objectives and requirements for this project have been established to ensure a high degree of confidence in the data obtained.

5.4.3.1 PARCC - DEFINITIONS AND EQUATIONS

Data quality and quantity are measured by comparison of resulting data with established acceptable limits for data precision, sensitivity, accuracy, representativeness, comparability, and completeness (PARCC) as described in US EPA document EPA/540/G-87/003 titled, "Data Quality Objectives for Remedial Response Activities." Data that have certain aspects that may be outside of PARCC QA objectives will be evaluated (according to Section 3.2.3 of the above DQO document) and the criteria contained in the specified analytical methods, to determine what, if any, aspects of the data can be defensibly used to meet the project objectives.

Precision

Precision measures the reproducibility of data or measurements under specific conditions. Precision is a quantitative measure of the variability of a group of data compared to the average value of the data. Precision is usually stated in terms of relative percent difference (RPD) or relative standard deviation (RSD). Measurement of precision is dependent upon sampling technique and analytical method. Field duplicate and laboratory duplicate samples will be used to measure precision for project samples. Both sampling and analysis will be as consistent as possible. For a pair of measurements, RPD will be used in this project. For a series of

measurements, RSD will be used. The total precision of a series of measurements can be related by the additive nature of the variances. Equations for RPD and RSD are presented below:

$$RPD = \frac{|D1 - D2| * 100}{(D1 + D2) / 2}$$

Where:

D1 and D2 = the two replicate values

$$S = \sqrt{\frac{\sum_{i=1}^n (x - x_i)^2}{n-1}}$$

$$RSD = \frac{S * 100}{x}$$

Where:

S	=	standard deviation
x _i	=	each observed value
x	=	the arithmetic mean of all observed values
n	=	total number of values

Accuracy

Accuracy measures the bias in a measurement system that may result from sampling or analytical error. Sources of error that may contribute to poor accuracy are:

- Laboratory error
- Sampling inconsistency
- Field and/or laboratory contamination
- Handling
- Matrix interference
- Preservation

Field and trip blanks, as well as matrix spike QC samples and laboratory control samples (LCSs), will be used to measure accuracy for project samples. Accuracy is calculated using the equation below:

$$\%R = \frac{SSR - SR}{SA} * 100$$

Where:

%R	=	% recovery
SSR	=	spike sample result

SR = sample result
SA = amount of spike added to sample

Representativeness

Representativeness expresses the degree to which sample data represent the characteristics of the media or matrix from which the data have been generated. Samples that are considered representative are properly collected to accurately characterize the nature and extent of contamination at a general sample location. Representativeness will be measured by using the methods (*e.g.*, sampling, handling, and preserving) in accordance with this sampling and analysis plan and the documents listed below.

1. "National Environmental Investigation Center (NEIC) Policies and Procedures Manual," May 1986, EPA 330/978-001R.
2. "US EPA Contract Laboratory Program Statement of Work for Organics Analysis Multi-Media, Multi-Concentration OLM04.2", May 1999.
3. "US EPA Contract Laboratory Program Statement of Work for Inorganic Analysis and Classical Chemistry Parameters Multi-Media, Multi-Concentration ILM05.0", January 2000.

Representativeness will also be measured by the collection of field replicates (*e.g.*, volatile organics). Comparison of the analytical results from field replicates will provide a direct measure of individual sample representativeness.

Comparability

Comparability expresses the confidence with which one data set can be compared with another data set from a different phase or from a different program. Comparability involves a composite of the above parameters as well as design factors such as sampling and analytical protocols. An acceptable level of comparability will be accomplished through the consistent use of accepted analytical and sampling methods.

Completeness

Completeness is defined as the percentage of data that is judged to be valid to achieve the objectives of the investigation compared to the total amount of data. Deficiencies in the data may be due to sampling techniques, poor accuracy, precision, or laboratory error. Although the deficiencies may affect certain aspects of the data, usable data may still be extracted from applicable samples. An evaluation of completeness necessarily involves an evaluation of the impact of missing data on the ability of the project to achieve its goals. This project has a goal of 90 percent completeness for the sample results. The equation used for completeness is presented below:

$$\%C = \frac{D * 100}{P * n}$$

Where:

D	=	number of confident quantification's
P	=	number of analytical parameters per sample requested for analysis
n	=	number of samples requested for analysis

As indicated previously, assessment of completeness alone does not provide a comprehensive evaluation of data quality; therefore, the percentage of unusable data will also be calculated by the following equations:

%Unusable Data = 100 times the number of sample results flagged "R" or "UR" divided
by the total number of results

%Usable Data = 100 - %Unusable Data

The definitions for the qualifier codes R and UR are presented in the Region III Modifications to the National Function Guidelines.

5.4.3.2 Procedures For Monitoring PARCC Parameters

PARCC parameters will be monitored through the submission and analyses of many types of field and laboratory QC samples. These will include appropriate equipment rinsate blanks, trip blanks, laboratory method blanks, field and laboratory duplicates or replicates, matrix spikes, laboratory control samples, and calibration and check standards. Laboratory control samples (LCSs) are samples containing a known or true value that the laboratory prepares and analyzes concurrently with project samples. An LCS is most useful in judging analytical accuracy.

The frequency by which the field QC samples will be prepared and submitted is specified in Section 5.4.9 of this QAPP. The quantitation limits or detection limits for all analytes that will be examined for this investigation are specified in the appropriate sections of the US EPA CLP protocols.

5.4.3.3 PARCC Objectives

PARCC parameter objectives have been developed for the analysis of aqueous and solid samples for the parameters to be analyzed. The PARCC parameter objectives are based on analytical methods, historical data, and published guidelines/criteria presented in the US EPA CLP protocols. The data quality objectives with respect to PARCC are summarized on Tables 5-2 and 5-3.

5.4.3.4 Field Measurements

Measurement data will be generated in many field activities that are incidental to collecting samples for analytical testing or unrelated to sampling. These activities include, but are not limited to, the following:

- Documenting time and weather conditions
- Locating and determining elevations of sampling stations
- Collecting air monitoring measurements
- Determining sample collection depths

The general QA objective for field measurement data is to obtain reproducible and comparable measurements to a degree of accuracy consistent with the intended use of the data through the documented use of standardized procedures. The procedures for performing these activities and the standardized formats for documenting these activities are presented in subsequent sections of this QAPP.

5.4.4 Sampling Procedures

The procedures to be followed as part of the collection of the post-excavation soil samples were discussed in detail in Section 5.3.7 of the Field Sampling Plan.

5.4.5 Sample Custody

Chain-of-custody (COC) is the process of tracking the handling of the sample from time of collection to analysis. The implementation of proper COC procedures provides defensible proof of sample and data integrity. A sample is under custody if: 1) it is in your possession; 2) it is in your view after being in your possession; 3) it was in your possession and you stored in a secured area; and/or 4) it is in a designated secured area. To ensure proper custody of the samples collected during these remedial activities is maintained at all times, the following procedures will be implemented in the field and laboratory.

Field Sample Custody

COC will be initiated in the field by the sampling team. All samples and sample containers will be kept under COC during field sampling activities. The custody of the samples and sample containers will be the responsibility of the Field Operations Manager (FOM) or personnel designated by FOM to collect the samples. The Field Operations Manager or the designated person completing the sampling will document each transfer of the samples and will be responsible for the custody of the samples until they are shipped to the laboratory.

Samples will only be collected in bottles supplied by CompuChem. If required, preservatives will be added to the sample bottles by the laboratory. After collecting the sample, a self-adhesive sample label will be attached to each container. The sample tags will contain the following information

- Project name
- Sample collection date and time
- Sample designation
- Sampler(s) name
- Preservatives present in the Sample Bottle
- Analyses requested
- Sample media and indication of whether the sample is a grab or composite
- Initials of the sampler(s)

A copy of the CompuChem sample tags that will be used for the post-excavation sampling activities is provided in Attachment 5A. The sample tags will be completed using waterproof, non-eraseable black ink. After properly labeling the sample containers, they will be placed in zip-lock bags and then into ice filled coolers.

Prior to shipment, the sample tags on each bottle will be inspected to ensure that they have been properly completed and all information has been provided. Each sample container will be placed in a zip-lock plastic bag and then into a metal or molded plastic insulated cooler. The coolers will be packed with ice or dry ice to ensure that the temperature inside the cooler is maintained at 4° C during its trip back to the laboratory. The bottles will be packed in the cooler to minimize potential damage during shipping. Also, a thin layer of styrofoam peanuts will be placed on the bottom of the cooler and in the annulus between the bottles in an effort to further reduce any damage to the sample bottles during shipment.

A chain-of-custody record will be completed by the Field Operations Manager for each shipment of samples to the laboratory. The completed COC record will be sealed in a zip-lock bag and taped to the inside lid of the cooler. When samples are being transferred (i.e., from the field to the laboratory), each person involved in the transfer must sign off on the COC record. A copy of the CompuChem COC record that will be used for the post-excavation sampling activities is provided in Attachment 5A. The COC record will be completed using waterproof, non-eraseable black ink.

After placing the COC record in the cooler, the cooler lid will be shut and fastened. Plastic shipping tape will be used to secure the drain and the lid. Two Custody Seals, one at each end of the cooler, will then be sealed to the cooler so that any tampering of the cooler (i.e., opening of the lid) can be documented by the laboratory. The identification number on the Custody Seals will be documented on the COC record and in the filed log book. A copy of the CompuChem Custody Seal that will be used for the post-excavation sampling activities is provided in Attachment 5A.

All sample coolers will be shipped directly to the laboratory using an overnight express delivery service following all appropriate DOT regulations. Since the COC record will be sealed inside the cooler, the courier will not have to sign the COC record. Upon receipt, the laboratory will inspect the cooler to make sure that it has not been tampered with and will compare the COC record to the contents of the cooler. A laboratory control number will be assigned to the samples and the samples will be logged into the laboratory computer sample inventory and tracking system.

All relevant information associated with the sample collection activities will be maintained in the field book. At a minimum, the following information will be maintained in the field log book:

- Date and time of sampling
- Persons completing the sampling
- Weather conditions at the time the samples were collected
- Results of field screening observations
- Sample designation and analyses requested to be completed
- Decontamination procedures implemented
- Type of equipment used to collect the samples
- Number of laboratory bottles collected and submitted for each location
- Sample collection depths and locations
- Quality assurance/quality control samples collected
- The location and designation of any blind duplicate samples collected
- Any unusual conditions observed during the sample collection activities

Laboratory Sample Custody

The procedures to be implemented by the laboratory once they receive the samples to ensure proper COC are outlined in Section 5.5 of CompuChem's Quality Assurance Manual, a copy of which is included in Attachment 5D.

5.4.6 Calibration Procedures

To ensure that the data collected meets the data quality objectives, various calibration procedures will need to be completed on field and laboratory equipment. These calibration procedures are discussed below.

Field Calibration

The primary field equipment that will be used during the remedial activities which will require calibration include the Photoionization Detector (PID) and the Mini-Ram. The PID will be calibrated each day prior to its use using 100 ppm isobutylene and zero air following the procedures outlined in the User's Manual for the 2020 Photoionization Air Monitor, a copy of which is included in Attachment 5E. The Mini-Ram is calibrated in the factory and will not need to be calibrated daily. However, the Mini-Ram will be zeroed in the field each day using the Z-Bag™ calibrator to ensure that it is still functioning properly. A copy of the Operations Manual for the Mini-Ram is included in Attachment 5F.

Laboratory Calibration

The calibration procedures and frequency of implementation to be performed by the laboratory are detailed in CompuChem's Quality Assurance Manual, a copy of which is included in Attachment 5D.

5.4.7 Analytical Procedures

The post-excavation soil and associated quality assurance/quality control samples (QA/QC) will be analyzed by CompuChem, a USEPA Contract Laboratory Program (CLP) approved laboratory located in Cary, N.C. Each post-excavation soil sample will be analyzed for the compounds of concern as identified during the previous site characterization activities. As discussed in Section 2.0, these compounds of concern include the volatile organic compound benzene; the semivolatile organic compounds acenaphthene, acetophenone, anthracene, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, carbazole, chrysene, dibenzo(a,h)anthracene, dibenzofuran, fluorene, fluoranthene, indeno(1,2,3-cd)pyrene, 2-methylnaphthalene, naphthalene and pyrene; the pesticides dieldrin and alpha-BHC; the PCB aroclor-1254; and the metals antimony, arsenic, barium, cadmium, chromium, lead, manganese, iron, selenium, silver, thallium and zinc. The blind duplicates, equipment rinsate blanks, and matrix spike/spike duplicates to be collected as part of the post-excavation sampling activities will be analyzed for the aforementioned compounds of concern. The trip blanks will be analyzed for benzene only. The volatile and semivolatile organic analyses will be performed using USEPA Method OLM04.2 (GC/MS) and the metal analyses will be performed using USEPA Method ILM04.2 (ICP).

The air samples to be collected during the remedial activities, as discussed in Section 6.6 of this RD/RAWP, will be analyzed for total dust and lead. The samples will be analyzed by Philip Analytical Services, an American Industrial Hygiene Association accredited laboratory, using NIOSH Methods 7300 for lead and 0500 for dust.

A summary of the analytical methods, sample holding times, sample containers, and preservations to be used, if any, are summarized in Table 5-1. The analytical method detection limits and the reporting limits for the various compounds/analytes to be tested for are discussed and presented in Section 3.6.3 of CompuChem's Quality Assurance Manual, a copy of which is included in Attachment 5D.

5.4.8 Data Validation, Reduction and Reporting

5.4.8.1 Data Validation

Data validation practices will be followed to ensure that raw data are not altered and that an audit trail is developed for those data that require reduction. All the field data, such as those generated during field measurements, observations, and field instrument calibrations, will be entered directly into a bound field notebook or standard field form. Each project team member will be responsible for proofing all data transfers made, and the Field Operations Manager will proof at least 100 percent of all data transfers and initial entries after each day's field activities.

Upon receipt of the sample data packages, the laboratory data for all essential sample analyses will be qualitatively and quantitatively validated under the direction of the Data Validation Coordinator. The results of the field duplicates and blanks will also be evaluated at this time.

The purpose of the project data validation performed under the direction of the Data Validation Coordinator is to verify and retrace the path of the sample from the time of receipt for analysis to the time the final data package report is generated. The Data Validation Coordinator will review the entire deliverables package for Chain-of-Custody completeness, holding time compliance, blank contamination, instrument tuning, initial and continuing calibration, matrix spike recoveries, laboratory duplicate precision, and overall system performance. A detailed data validation report describing the difficulties encountered and shortcomings of the deliverables package as well as data quality issues will be prepared to assist in making decisions based on the analytical results.

Identification and Treatment of Outliers

Outliers represent unusually large or unusually small values in a population of observations. For example, if there is a waste stream that historically has detected levels of arsenic at 50 µg/L, a reported result of 200 µg/L or 5 µg/L for arsenic in a subsequent analysis of the waste stream should be investigated as an outlier. Outliers may be the result of a variety of factors (field-related or laboratory-related), including any of the following:

- Sampling artifact
- Sample integrity problem
- Incorrect transcription of sample identification in the field or laboratory
- Unique environmental conditions
- Faulty or defective instruments
- Inaccurate reading of meters
- Errors in recording of data
- Calculation errors
- Analytical errors

Procedures for the identification of outliers will be followed at both the analytical stage and at the ensuing data reduction stage. In addition, an independent assessment of the data is performed to verify the quality of the data and to check for outliers due to transcription or calculation errors.

Outliers in laboratory data can be caused by errors in analysis or by site-specific conditions that are out of the control of the laboratory. Errors in the laboratory are most often identified in the data review and validation process. It is necessary to eliminate outliers from QC data because of the skewing effect, which can destroy the effectiveness of the QC data.

Outliers will be identified at the data reduction stage by the Data Validation Coordinator. When a particular value is suspected to be an outlier, the following steps will be taken:

- The Data Validation Coordinator will check other data from the same sample to see if these data are also anomalous. If multiple analytes from the analysis of a sample are suspected to be outliers, the sample may have to be resampled and reanalyzed, based on the Project Manager's discretion. No resampling will be completed without prior approval of the USEPA.

- The Data Validation Coordinator will interview the field crew and review the associated field notes. If the samplers demonstrate standard competency in the sampling procedure used at the time the sample with the anomalous value was obtained, sampling errors will be dismissed as a possible cause of the outlier. Problems with the sampling equipment or incorrect procedures used for sampling may be cause to invalidate suspected outliers.
- The Data Validation Coordinator will interview the analyst(s) involved with the generation of the anomalous result. The analyst(s) will be asked to examine his/her notes and calculations and, if possible, to rerun the sample for the specific parameter in question. Results of any samples rerun outside of holding time will be used for comparative purposes. Problems with the analysis of the sample or incorrect analytical procedures may be cause to invalidate the suspected outliers. Outliers caused by transcription errors or calculation errors, however, are generally identified and corrected, and valid sample results are obtained. The data validation of the analytical results (described in Section 5.4.8.4) will assist the Data Validation Coordinator in identifying transcription and calculation errors.
- If, after reviewing the field procedures and the laboratory analysis of the sample, the Data Validation Coordinator has not determined a valid reason for the anomalous result, the statistical approach of Dixon (Taylor, 1987) will be used to decide if the difference between the result and the historic data is statistically significant. If the result is determined to be an outlier by Dixon's test, the result will not be used for data qualification or for the decision-making process for risk assessment. Otherwise, the result will be considered a valid sample value (depending on other quality assurance measurements) and will be included in the decision-making process.

Rejection of any suspect data or outlier will only be at the discretion of the Data Validation Coordinator and Project Manager in conjunction with the Quality Assurance Officer.

- Field crew - If samplers demonstrate standard competency in the sampling procedure used at the time the sample with the anomalous value was obtained, sampling errors will be dismissed as a possible cause of the outlier.
- Analyst(s) - The analyst(s) will be asked to examine his/her notes and calculations and, if possible, to rerun the sample for the specific parameter in question. Results of any samples rerun outside of holding time will be used for comparative purposes.

Rejection of any suspect data or outlier will only be done by the Data Validation Coordinator and Project Manager in conjunction with the Quality Assurance Officer. The data will be rejected as an unacceptable outlier if:

- A problem with equipment or an incorrect procedure used during the sampling event is identified
- The reanalysis by the analyst generates a value that significantly differs from the value being examined

5.4.8.2 Data Reduction

A hardcopy sample summary package of the analytical data will be prepared in accordance with the requirements of the US EPA CLP protocols and delivered by the laboratory to Penn E&R. In addition, a complete data package will be prepared in accordance with the requirements of the US EPA CLP protocols and will be delivered by the laboratory to Environmental Standards. (Data package contents are described in the individual USEPA CLP protocols.) The final validated results will be included in the final quality assurance report; the final validated results will then be available to the Project Team for use in evaluation and interpretation.

5.4.8.3 Data Reporting

Data packages will be prepared by the laboratories according to the procedures described in the applicable USEPA CLP protocols. One copy of the complete data package will be delivered to Environmental Standards; this copy will be used in validating the analytical data. Penn E&R will receive a copy of the summary data package. The laboratory will be required to archive all raw data associated with this project for a period of 10 years and will notify Penn E&R prior to disposal of any project-associated information.

All aqueous analytical data generated by the laboratories will be reported in units of $\mu\text{g/L}$ (TCL organics and metals). All soil/solid sample analytical data generated by the laboratories will be reported in units of $\mu\text{g/kg}$ (TCL organics) and mg/kg (metals and wet chemistry parameters). Additionally, all soil/solid sample data will be reported on a dry-weight basis. Sample results will not be corrected for contamination detected in laboratory blanks.

An overall view of data flow from the point of raw data collection through storage of validated data is shown in Figure 5-3.

5.4.8.4 Data Validation

Overall Project Assessment

Overall data quality will be assessed by a thorough understanding of the project objectives and data quality objectives that were developed for this project. By maintaining thorough documentation of all decisions made during the sampling event, performing periodic field and laboratory audits, thoroughly reviewing and auditing (validating) the analytical data as they are generated by the laboratory, and providing appropriate feedback as problems arise in the field or at the laboratory, all field and laboratory data accuracy, precision, and completeness will be closely monitored.

Field Data Quality Assessment

To ensure that all field data are collected accurately and correctly, the Quality Assurance Officer will perform field audit(s) during key phases of sample collection to document that the appropriate procedures are followed with respect to sample (and QC sample) collection. These

audits will include a thorough review of the field books and standard data collection forms used by the project personnel to ensure that all tasks are performed as specified in the FSP and QAPP.

The field audits will necessarily enable the data quality to be assessed with regard to the field operations. In addition, the Field Operations Manager will review all project logbooks at the conclusion of each day's sampling activities.

The evaluation (data review) of field blanks and other field QC samples will provide definitive indications of the data quality. If a problem arises, it should be possible to isolate the problem via the complete sample tracking and documentation procedures that will be performed. If such a problem does arise, corrective action can be instituted and documented. If data are compromised due to a problem, appropriate data qualifications will be used to identify the data.

Laboratory's Data Quality Assessment

For this project, the methods that the analytical laboratory will use to determine precision and accuracy and their acceptability are well defined in the specified USEPA CLP protocols. In general, for all routine parameters, accuracy is calculated through percent recovery. Similarly, precision is expressed as relative percent difference or percent relative standard deviation. Applicable equations are presented in the Quality Assurance Objectives for Measurements Section of this QAPP.

Independent Assessment Of Data Quality

All analytical data generated by the laboratory during the post-excavation sampling activities will undergo a rigorous independent data review and validation prior to final evaluation and interpretation. The data validation will be performed by Environmental Standards. The data will be validated to determine compliance relative to the requirements of the specified analytical protocol (USEPA CLP) and analytical data quality in accordance with the following guidance documents:

“Region III Modifications to National Functional Guidelines For Organic Data Review Multi-Media, Multi-Concentration (OLM01.0 – OLM01.9),” September 1994.

“Region III Modifications to the Laboratory Data Validation Functional Guidelines for Evaluating Inorganics Analyses,” April 1993.

In addition, Environmental Standards will use professional judgment in qualifying the data for issues not addressed specifically in the above-referenced documents.

A preliminary review will be performed to verify that all necessary paperwork (Chain-of-Custody Records, analytical reports, laboratory personnel signatures, etc.) and deliverables for the analyses are present.

A detailed quality assurance review will be performed to independently verify compliance to the required analytical protocols and to determine the qualitative and quantitative reliability of the

data as presented. The review will include a detailed analysis and interpretation of all data generated by the laboratory. Table 5-4 presents some of the items examined during the quality assurance review.

Quality assurance reports will be prepared to summarize the data validation findings and these reports will be distributed to the Project Team to ensure the validated data is used for the final evaluation and interpretation. The report will consist of a general introduction section, followed by qualifying statements that should be taken into consideration such that the analytical results can be best utilized.

Based on the quality assurance review, specific codes will be placed next to results in the database to provide an indication of the quantitative and qualitative reliability of the results. Data validation qualifier codes will be those defined in the above-referenced documents. During the course of the data review, a full organic and inorganic support documentation package that will provide backup information and will accompany all qualifying statements presented in the quality assurance review will be prepared.

Once the review has been completed, the Data Validation Coordinator will submit the report to Penn E&R. These approved quality assurance reviews will be signed and dated by the Data Validation Coordinator.

Management Data Quality Assessment

The analytical data generated from the investigation are validated, qualified, and submitted to the Penn E&R Project Managers. The quality of the data will be assessed from an overall management perspective by an evaluation of the analytical results with respect to the project objectives and data quality objectives. The evaluation will determine if the generated data are adequate to meet the objectives and/or may identify the need for new data to fill data gaps.

5.4.9 Internal Quality Control

This Section of the QAPP outlines the internal quality control (QC) checks that will be used to evaluate the precision and accuracy of analytical data. The field QC checks are used to identify potential problems associated with sample handling and procedures, and laboratory QC checks are used to identify potential problems with sample preparation and analysis. The data quality objective criteria for these internal QC checks are presented in Tables 5-2 and 5-3.

Field Internal Quality Control Checks

Field Internal Quality Control Checks will be utilized during the remedial activities through the collection and analysis of the following QA/QC samples:

Trip Blanks

One trip blank will accompany each shipment of sample to the laboratory. The trip blank will consist of deionized water in a 40-mil vial supplied by the laboratory with the bottleware. The

trip blanks will be preserved with hydrochloric acid. The trip blank will accompany the sampling team during the sampling activities and will serve as a QC check for possible cross-contamination from external sources and the analytical method. The trip blanks submitted for this project will be analyzed for the volatile organic benzene.

Equipment Rinsate Blanks

One equipment rinsate blank will be generated per twenty environmental samples collected. The equipment rinsate blanks will be collected in the field by pouring deionized water over decontaminated sampling equipment used to collect the post-excavation samples. The deionized rinsate water will be collected directly into laboratory supplied sample containers. The rinsate blanks will be used to confirm the effectiveness of the field decontamination procedures. The field rinsate blanks will be analyzed for the same compounds that the post-excavation samples are analyzed.

Blind Duplicates

One blind duplicate sample will be collected per twenty environmental samples submitted for laboratory analysis. The blind duplicate samples will be collected by generating twice the required sample volume at the selected post-excavation sample location. The volatile organic fraction for both the environmental sample and the blind duplicate will be collected first. After homogenization, the remaining sample containers for both the environmental sample and the blind duplicate will be filled. The results for blind duplicate samples will be compared to those generated for the corresponding post-excavation sample to check analytical and sampling precision. The blind duplicates will be analyzed for the same compounds that the post-excavation samples are analyzed.

Matrix Spike/Matrix Spike Duplicates

One matrix spike and one matrix spike duplicate will be collected per twenty environmental samples submitted for laboratory analysis. These samples will be spiked by the laboratory to assess accuracy and precision and possible effects of matrix interference. The matrix spike and matrix spike duplicates will be collected by generating three times the required sample volume at the selected post-excavation sample location. The volatile organic fraction for the environmental sample, matrix spike, and matrix spike duplicate will be collected first. After homogenization, the remaining sample containers for the environmental sample, matrix spike, and matrix spike duplicate will be collected. The matrix spike and spike duplicates will be analyzed for the same compounds that the post-excavation samples are analyzed.

Internal Laboratory Quality Control Checks

The internal quality control checks to be used by the laboratory to monitor accuracy, precision, external contamination and extraction efficiency, among others, are detailed in CompuChem's Quality Assurance Manual, a copy of which is included in Attachment D5.

5.4.10 Performance and System Audits

The field and laboratory performance/systems audits to be completed are discussed below.

Field Audits

Penn E&R's Quality Assurance Officer will complete one on-site system field audit. The primary objectives of this audit will be to ensure that all on-site activities are being completed in accordance with the procedures outlined in this RD/RAWP. The audit will include verification and documentation of the following:

- All excavation, loading, and sampling activities are being completed in accordance with the Site-Specific Health and Safety Plan and Sampling and Analysis Plan.
- All equipment leaving the site and used to collect post-excavation soil samples are being properly decontaminated
- Off-site shipments of waste are being properly manifested
- Completeness and accuracy of the Chain-of-Custody forms, sample labels/tags, and sample packing and shipping procedures
- Completeness and accuracy of field note books including the collection of detailed daily notes regarding on-site visitors, problems encountered and corrective actions implemented, samples collected and shipped to the laboratory on a daily basis

The results of the on-site audit will be summarized in the field log book and in a written report. The audit report will be prepared by the Quality Assurance Officer and reviewed by the Project Manager. Any deficiencies noted will be addressed during the audit but will be noted in the report along with the appropriate corrective actions that were implemented.

Laboratory Audits

CompuChem is a USEPA CLP approved laboratory and has a comprehensive performance and system audit program in-place. A description of CompuChem's performance and system audit program along with the frequency of the audits is detailed in their Quality Assurance Manual, a copy of which is included in Attachment 5D.

5.4.11 Preventive Maintenance

The field and laboratory preventive maintenance activities that will be implemented to reduce downtime and potential impacts on data quality are discussed below.

Field Maintenance

The PID and Mini-Ram are maintained on a regular basis before and after each use. The general maintenance activities that are required to ensure the proper functioning of the PID and Mini-Ram are described in Attachments 5E and 5F, respectively. The Field Operations Manager will ensure that an inventory of spare parts for these meters and other pieces of equipment is maintained. Spare parts that often require replacement (i.e., filters, bulbs) will be maintained on-

site. The preventive maintenance for sampling equipment will include ensuring that the equipment is clean and in good condition for its intended use, sample bottles are clean and not damaged, and the appropriate sampling equipment is available and on-site to implement the required sampling. Also, the Field Operations Manager will ensure that a sufficient supply of health and safety equipment (i.e., boots/tyvek, gloves) and decontamination supplies (i.e., soap and tap water, acetone, brushes) are maintained on-site.

Laboratory Maintenance

CompuChem is a USEPA CLP approved laboratory and has a comprehensive maintenance program in-place. A description of CompuChem's maintenance program is detailed in their Quality Assurance Manual, a copy of which is included in Attachment 5D. Also, CompuChem generally has more than one instrument required to complete the various analyses required as part of this remediation project. Therefore, if a piece of equipment malfunctions or does not meet the required measurement criteria, other instruments can be used for the required analyses.

5.4.12 Procedures To Be Used To Evaluate Data Quality

The procedures to be used to evaluate precision, accuracy, and completeness are presented in Sections 5.4.3 and 5.4.8 of this QAPP. Also, specific procedures to be followed by the analytical laboratory are outlined in CompuChem's Quality Assurance Manual, a copy of which is included in Attachment 5D. Also, field and laboratory audits, as described in Section 5.4.10, will also be used in the field and by the laboratory to evaluate precision, accuracy, and completeness.

5.4.13 Corrective Action

Corrective action is the process of identifying, recommending, approving and implementing measures to counter unacceptable procedures, deviations from approved procedures or methodologies, or out of control quality control performance that can affect data quality. The need for corrective action may be determined by any member of the project team including samplers, analysts, supervisors, quality assurance personnel, or laboratory managers. The detection of system and performance problems and the corrective actions methods implemented in the field during monitoring and post-excavation sample collection activities will be documented in the field book and the Monthly Progress reports. Any problems that can not be resolved by the Field Operations Manager will be brought to the attention of the Project Manager. The Project Manager and, if required, the USEPA Remedial Project Manager, will determine the corrective action to be taken, if any. The Project Manager will be responsible for appropriate follow-ups to ensure that corrective actions are implemented, complete and effective, and the problem is not repeated.

The corrective actions that will be implemented during data validation for any measurements that do not meet the PARCC criteria established for this site, as summarized in Tables 5-2 and 5-3, are discussed in Section 5.4.8.

Corrective action measures and procedures to be implemented by the analytical laboratory

are outlined in Section 13 of CompuChem's Quality Assurance Manual, a copy of which is included in Attachment 5D.

5.4.14 Quality Assurance Reports

This Section of the QAPP outlines the Quality Assurance reports that will be developed as part remediation of the CSFA.

Monthly Progress Reports will be developed and submitted to the USEPA. These reports will include a summary of the activities completed on the project during the previous month including a discussion of all field sampling and remedial activities. The Monthly Progress report will include a section dealing specifically with Quality Assurance issues. The QA Section of the Monthly Progress reports will include a summary of any significant QA/QC issues identified and the corrective actions implemented, a discussion of the results of any audits performed, and a discussion of any required modifications to the FSP or QAPP. The Project Manager will also develop Summary Memorandums for submittal to the PADEP to address any significant QA issues that need to be addressed in a more timely manner.

As discussed in Section 5.4.8, a separate QA Report will be prepared to summarize the data validation findings. This report will include a discussion of the usability of the data including appropriate qualifiers to provide an indication of the quantitative and qualitative reliability of the results.

Section 10 in CompuChem's Quality Assurance Manual, a copy of which is included in Attachment 5D, presents the laboratory's procedures for QA reports to management.

The Remedial Action Report to be completed at the completion of the remedial activities will also include a specific section that will discuss all pertinent QA issues identified and addressed during the project

Initially, Penn E&R will store all original documents in a secured data storage area at our offices in Hatfield, PA. These documents will include all field notes, QA/QC audits, laboratory data reports, work plans and reports, and all other records and documents generated during the implementation of the remedial activities in the CSFA. After completion of the remedial activities, these records will be transferred to LPT's Corporate offices. LPT will maintain these files for 10 years after receiving a Certification of Completion of the Work from the USEPA.

TABLE 5-1

**SUMMARY OF ANALYSES TO BE COMPLETED, SAMPLE CONTAINERS,
PRESERVATION AND HOLDING TIMES FOR POST-EXCAVATION AND QA/QC
SAMPLES COLLECTED FROM THE CINDER/SLAG FILL AREA**

ANALYSES TO BE COMPLETED ⁽¹⁾	ANALYTICAL METHOD	HOLDING TIME ⁽²⁾		CONTAINERS		VOLUME OF SAMPLE REQUIRED		PRESERVATION	
		Soil	Water	Soil	Water	Soil	Water	Soil	Water
Volatiles	OLM04.2 (GC/MS)	14 days	14 days	Encore™ Sampler	40-mil glass with teflon lids	15 grams	3-4 mil vials	Cool to 4°C	HCL, Cool to 4°C
Semivolatiles	OLM04.2 (GC/MS)	14 days	14/40 days ⁽³⁾	8 oz. Glass	1-liter amber glass	50 grams	2 liters	Cool to 4°C	Cool to 4°C
Pesticides/PCBs	OLM04.2 (GC/MS)	14 days	7 days	8 oz. Glass	2,000-mil glass	8 oz.	2,000 mil	Cool to 4°C	Cool to 4°C
Metals	OLM04.1 (ICP)	180 days	180 days	8 oz. Glass	500-mil plastic	30 grams	500 mil	Cool to 4°C	HNO ₃ , Cool to 4°C

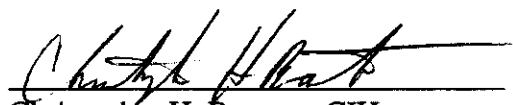
Notes

- (1) - The post-excavation soil and QA/QC samples will be analyzed for the volatile organic compound benzene; the semivolatile organic compounds acenaphthene, acetophenone, anthracene, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, carbazole, chrysene, dibenzo(a,h)anthracene, dibenzofuran, fluorene, fluoranthene, indeno(1,2,3-cd)pyrene, 2-methylnaphthalene, naphthalene and pyrene; the pesticides dieldrin and alpha-BHC; the PCB aroclor-1254; and the metals antimony, arsenic, barium, cadmium, chromium, lead, manganese, iron, selenium, silver, thallium and zinc
- (2) - Holding times are based upon time of collection.
- (3) - The laboratory has 14 days to extract samples for analysis of semivolatile organic compounds, and 40 days from extraction to analyze.

SECTION 6.0

**SITE HEALTH AND SAFETY PLAN
FOR THE CINDER/SLAG FILL AREA LOCATED
ON LPT'S 2301 RENAISSANCE BOULEVARD PROPERTY**

Prepared by:



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9/13/01
Date



Michael A. Christie, P.G.
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9/13/01
Date

6.0 SITE HEALTH AND SAFETY PLAN

6.1 General Information and Scope of Work

6.1.1 Project Description

The cinder/slag fill area (CSFA) is located in the north-central portion of LPT's 2031 Renaissance Boulevard Property as shown on Figures 6-1. The CSFA consists primarily of glass, ash, coal dust, cinders, and slag. There is a very small quantity of tar-like material located on the surface of this area. As shown on Figure 6-2, the surface expression of the CSFA encompasses an area, on average, about 240 feet long by 125 feet wide. The thickness of the fill ranges from 1-foot along the perimeter of the area to up to 12 feet in the central portion of the CSFA. However, the fill material is, on average, from 3 to 4 feet thick. There is approximately 4,000 cubic yards of fill located in this area. The source of the fill is not known, however, based on historical aerial photographs, it was placed in this area prior to 1959.

The remedy selected for this area includes the excavation and off-site disposal of the material located in the CSFA, the collection and analysis of post-excavation soil samples, and the backfilling of the resultant excavation. This Site-Specific Health and Safety Plan (SSHASP) has been prepared to support the remedial activities to be implemented in the cinder/slag fill area.

6.1.2 Site Background

Soil Sampling

As indicated above, the CSFA consists primarily of glass, ash, coal dust, cinders, and slag. There is a very small quantity of tar-like material located on the surface of this area. There is approximately 4,000 cubic yards of fill located in this area. The source of the fill is not known, however, based on historical aerial photographs, it was placed in this area prior to 1959.

Various site characterization activities have been completed in the CSFA over the course of the past three activities. As part of these activities, numerous test trenches and soil borings have been installed through and adjacent to the CSFA to help define the limits and the contents of the area. From these test trenches and soil borings, seven environmental samples and one blind duplicate have been collected from the CSFA. These samples were designated FT-3, CSFA-22 through CSFA-27, and CSFA-40, which was a duplicate of sample CSFA-23. The seven samples and duplicate were analyzed for the Target Compound List (TCL) volatile and semivolatile organic compounds and the Target Analyte List (TAL) inorganics (i.e., metals and cyanide).

The results of the analysis of these sample are summarized in Tables 6-1 and 6-1A, and a copy of the laboratory analytical data sheets is included in Attachment 6A. In evaluating the sample results, the data were compared to Act 2 non-residential direct contact and soil-to-groundwater Medium Specific Concentrations (see Table 6-1) developed pursuant to Pennsylvania's Land

Recycling and Environmental Remediation Standards Act (Act 2) and USEPA Region III generic risk-based concentrations and soil screening levels (see Table 6-1A). Also, as requested by the EPA, the soil sample results for non-carcinogenic compounds were compared to one-tenth of their normal RBC/SSL.

A review of Table 6-1 shows that no volatile organic compounds were detected above their Act 2 MSCs. Also, with the exception of benzo(a)pyrene in sample CSFA-27, no semivolatile organic compounds were detected above their Act 2 MSCs in the six samples. Benzo(a)pyrene was detected at a concentration of 12 mg/kg in sample CSFA-27, which just exceeds its direct contact MSC for surface soil of 11 mg/kg. The metal lead was detected above both its direct contact MSC for surface soil and soil-to-ground water MSC of 1,000 mg/kg and 450 mg/kg, respectively, in samples FT-3, CSFA-22, CSFA-23, CSFA-25, CSFA-27 and duplicate sample CSFA-40. Lead was detected above its soil-to-ground water MSC but not its direct contact MSC in samples CSFA-24 and CSFA-26. Also, thallium was detected just above its soil-to-ground water MSC of 14 mg/kg in samples CSFA-22 (17.3 mg/kg), CSFA-24 (25.8 mg/kg), and CSFA-25 (16.7 mg/kg). No other metals were detected above their Act 2 MSCs in the six samples collected from the CSFA.

A review of Table 6-1A shows that the volatile organic compound benzene was detected above its very restrictive USEPA SSL of 0.0018 mg/kg in samples CSFA-22, CSFA-23, CSFA-25, and CSFA-26. No other volatile organic compounds were detected above their USEPA RBCs or SSLs. No semivolatile organic compounds were detected above their USEPA RBCs/SSLs in samples CSFA-25 and CSFA-26, and only benzo(a) pyrene was detected above its USEPA RBC/SSL in sample CSFA-24. Samples CSFA-22, CSFA-23 (and duplicate sample CSFA-40), and CSFA-27 exhibited a few semivolatile organic compounds above either their USEPA RBC or SSL. With the exception of benzo(a)pyrene in sample CSFA-27, none of these semivolatile organic compounds were detected above Act 2 MSCs. The metals arsenic, iron, and lead (with the exception of sample CSFA-24) were detected above their USEPA RBC in each of the samples. Also, manganese in sample CSFA-23 and thallium in samples CSFA-22, CSFA-24, and CSFA-25 were detected above their USEPA RBC. Additionally, the metals arsenic, barium, cadmium, chromium, manganese, selenium, silver (only in samples CSFA-23 and CSFA-24), thallium and zinc were detected above their USEPA SSLs in each of the samples. With the exception of thallium in samples CSFA-22, CSFA-24 and CSFA-25, none of these metals were detected above Act 2 MCSs.

As indicated earlier, CSFA-40 was a duplicate sample of CSFA-23. As shown in Table 6-1, sample CSFA-23 exhibited a lead concentration of 1,490 mg/kg. However, duplicate sample CSFA-40 exhibited lead at a concentration of 25,000 mg/kg. Based on this wide disparity between the lead concentration, Penn E&R requested that the laboratory reanalyze sample CSFA-40 for lead. This reanalysis of sample CSFA-40 revealed lead to be present at a concentration of 1,010 mg/kg, which is similar to the lead concentration detected in the environmental sample, sample CSFA-23, from which duplicate sample CSFA-40 was collected and the lead concentration for the other five samples collected from the CSFA.

The relatively similar lead concentrations in sample CSFA-23 (1,490 mg/kg) and the reanalysis of duplicate CSFA-40 (1,010 mg/kg) suggest that these results are more indicative of the lead concentration of the material in this portion of the cinder/slag fill area. The elevated lead concentration detected in the original analysis of duplicate sample CSFA-40 likely was biased high as the result of the presence of a small quantity of material with an anomalously high concentration of lead (i.e. piece of lead solder).

As indicated in Section 2.0, the USEPA and/or the Agency's oversight contractor were on-site throughout the remedial design site characterization activities. The USEPA split the samples obtained from borings CSFA-22 and CSFA-27 and collected two other samples and a duplicate. The EPA's splits of samples CSFA-22 and CSFA-27 were designated C0252 and C0253, respectively. The other two samples were designated C0254 and C0255. EPA's sample C0256 was a duplicate of sample C0255. These samples were analyzed for the TCL volatile and semivolatile organic compounds, pesticides/PCBs, and the TAL inorganics. The results of the analysis of these samples are summarized in Table 6-2, and a copy of the analytical data sheets is included in Attachment 6A. As shown on Table 6-2, the EPA sample results were compared to USEPA Region III RBCs and SSLs.

A review of Table 6-2 shows that only the volatile organic compound benzene in sample C0255 and its duplicate, sample C0256, was detected above its very stringent USEPA SSL of 0.0018 mg/kg. No other volatile organic compounds were detected above USEPA RBCs/SSLs in the four samples collected from the CSFA by the USEPA. Each of the four samples displayed the semivolatile organic compounds benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, carbozole, dibenzo(a,h)anthracene and naphthalene (with the exception of sample C0252) above their respective USEPA RBC and/or SSL. Also, the compounds 2-methylnaphthalene, dibenzofuran and indeno(1,2,3-cd)pyrene were detected above their USEPA RBC and/or SSL in samples C0254 and C0255. Additionally, acenaphthene, anthracene, benzo(k)fluoranthene, chrysene, fluoranthene, fluorene and pyrene were detected above their USEPA RBC and/or SSL in sample C0255. The compound 2-acetophenone was detected above its USEPA SSL in sample C0253.

The PCB aroclor 1254 was detected above its USEPA RBC and SSL in sample C0254 but was not detected above its RBC/SSL in the other three samples. Also, as discussed above, no PCBs were detected in the characterization samples obtained from the CSFA in March 1998/October 1999. The absence of PCBs above USEPA RBCs and SSLs in the other three samples collected by EPA and the three previous characterization samples collected from the CSFA by Penn E&R suggest that PCBs may not be indicative of the makeup of the fill material. The pesticide dieldrin was detected above its USEPA SSL but not its RBC in samples C0254 and C0255. As indicated in the analytical data package, the laboratory stated that it believed that the dieldrin peak on the chromatograph for sample C0254 may be associated with the presence of the PCB aroclor 1254. If this is the case, dieldrin may not be present in sample C0254. Also, alpha-BHC was detected above its USEPA SSL in sample C0255 and its duplicate sample C0256.

The metal arsenic was detected above its USEPA RBC and SSL in each of the four samples. Also, lead was detected above its USEPA RBC in each of the four samples and iron was detected

above its USEPA RBC in sample C0253. Additionally, barium, cadmium (except sample 0254), chromium, manganese, selenium (except sample C0258) and zinc (except sample C0254) were detected above their USEPA SSL in each of the four samples.

Air Monitoring

During on-site characterization activities implemented in May, 2001, air monitoring for total dust and lead was completed. (Lead was selected as it was the primary contaminant of concern detected in the CSFA). Personal air monitors were placed on the Penn E&R on-site representative and the driller during the two days that borings were installed through the CSFA. Neither total dust nor lead were detected close to their respective OSHA Action Levels/PELs in the four personal air samples collected during the soil borings installation activities. A copy of the air monitoring results is included in Attachment 6B.

6.1.3 General Safety Requirements

This SSHASP was developed based on currently known conditions and represents the minimum health and safety requirements that must be followed by all personnel on-site implementing remedial activities in the CSFA. Like all sites, unknown conditions may exist and known conditions may change. Should conditions change that could possibly impact the selected personal protective equipment specified in this SSHASP, work in the CSFA will be stopped immediately. Work will not continue until Penn E&R's Project Manager and Corporate Health and Safety Officer have reevaluated potential risks and revised, as may be necessary, this SSHASP.

All site personnel involved with the on-site remedial activities in the CSFA must read this SSHASP carefully and complete the Safety Briefing Form included in Attachment 6C. All on-site personnel must follow the health and safety procedures outlined herein, be aware at all times of the heavy equipment that will be working in the CSFA and surrounding areas, and above all, use common sense.

All personnel on-site who will work within the CSFA or who could come in contact with the CSFA, will have current OSHA 40-hour training, including annual 8-hour refresher training, in accordance with 29CFR 1910. Personnel acting in a supervisory role will also have 8-hour supervisory training. Also, as required by 29 CFR 1910.120, all personnel on-site must have medical clearance to complete their designated work assignments.

6.1.4 Designated Safety and On-Site Personnel

Personnel responsible for implementing this SSHASP include the following:

Christopher Branton, CIH
Corporate Health & Safety Officer

Penn E&R
Office Number (215) 997-9000
2755 Bergey Road
Hatfield, PA 19440

Thomas R. Christie
On-Site Safety Coordinator
Penn E&R
Office Number (215) 997-9000
Field Cellular Number (267) 246-1897
2755 Bergey Road
Hatfield, PA 19440

Michael A. Christie
Project Manager
Penn E&R
Office Number (215) 997-9000
Field Cellular Number (267) 246-1897
2755 Bergey Road
Hatfield, PA 19440

Jeffrey E. Goudsward
Field Operations Manager
Penn E&R
Office Number (215) 997-9000
Field Cellular Number (267) 246-1905
2755 Bergey Road
Hatfield, PA 19440

6.2 Biological, Physical, and Chemical Hazard Evaluation

There are potential biological, physical and chemical exposure hazards associated with the remedial activities to be implemented in the CSFA.

6.2.1 Biological Hazards

The primary possible biological hazards at the site include insects (bees, spiders, wasps, ticks), snakes and poisonous plants (poison ivy, poison sumac), and contact with waste materials can lead to infected cuts. The potential to come in contact with poisonous plants, snakes and insects is low because the site has been cleared of trees and other vegetation. Exposure to these hazards will be minimized with appropriate standard work clothing that will be required at the site (i.e., long pants and sleeved shirts) and general awareness of the surroundings. Also, the potential to come in contact with the fill in the CSFA is low as well because protective clothing (i.e., standard work clothes, gloves, tyvek) will be worn by all personnel who have the potential to come in contact with the fill material.

6.2.2 Physical Hazards

The primary physical hazards that may be encountered during the on-site remedial activities include the presence of heavy equipment (dozer and trackhoe, triaxle dump trucks) and heat stress as on-site work will be implemented during the summer months. Field personnel will be made aware of the need to be alert at all times to the hazards associated with heavy equipment, which include noise, crushing injuries, overhead hazards, and pinch points, at each daily site safety meeting. The daily safety meetings will also be used to remind and alert on-site personnel to other physical hazards that exist at the site such as slip/trip/fall hazards, weather-related hazards (lightening), puncture wounds from sharp object, and vehicle traffic in adjacent roadways.

Working outside during the summer months in protective clothing as that may be required in the CSFA increases the chances of heat stress for on-site personnel. The signs and symptoms of heat stress and procedures to be followed to prevent problems associated working in the heat are summarized in Attachment 6D.

No confined space work is anticipated.

6.2.3 Chemical Hazard

As discussed in detail in Section 2.0 and summarized above in Section 6.1.2, the material in the CSFA has been thoroughly characterized through the installation of over 30 soil borings and 9 test trenches and the submittal of eleven soil samples for analysis of the TCL volatile and semivolatile organic compounds and the TAL inorganics (i.e., metals and cyanide). Additionally, four of these samples were analyzed for the TCL pesticide and PCB compounds. The results of the analyses of these samples are summarized in Tables 6-1, 6-1A, and 6-2.

Also, during on-site characterization activities implemented in May, 2001, air monitoring for total dust and lead was completed. (Lead was selected as it was the primary contaminant of concern detected in the CSFA). Neither total dust nor lead were detected at concentrations which approached their respective OSHA Action Levels/PELs in the four personal air samples collected during the installation of the soil borings in the CSFA. A copy of the air monitoring results is included in Attachment 6B.

The potential for chemical exposures while in the CSFA were reviewed utilizing the soil results summarized in Tables 6-1, 6-1A and 6-2, and the air monitoring results included in Attachment 6B. All compounds detected in the soil samples were reviewed for potential risk. Based on this review, any compounds that were detected above either a direct contact risk based cleanup standard developed pursuant to Pennsylvania's Land Recycling and Environmental Remediation Standards Act (Act 2) or USEPA Region III Risk Based Concentrations (RBCs) were identified as the primary compounds of concern and additional evaluation into potential risks to on-site workers for these compounds was completed. Based on this evaluation criteria, the primary compounds of concern included the metals arsenic, iron, lead, manganese and thallium; the

semivolatile organic compounds benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, dibenzo(a,h)anthracene and indeno(1,2,3-cd)pyrene; and the PCB aroclor 1254. Material Safety Data Sheets (MSDS) for these primary compounds of concern are included in Attachment 6E.

6.2.3.1 Metals

The metals arsenic, iron, lead, manganese and thallium were detected above either their Act 2 direct contact cleanup standard or USEPA Region III RBC. Lead was selected as the highest hazard on-site based on concentrations known to be present in the CSFA and its OSHA permissible approved level (PEL), which is 50 ug/m³. Although other metals were detected above their USEPA RBC but not their Act 2 direct contact cleanup standard, the levels at which they were detected in the soil samples and their OSHA PEL do not pose potential risks that exceed those associated with lead for the on-site workers. Therefore, if exposures to lead are controlled to acceptable levels, the presence of the other metals will not present a concern to on-site workers.

The average lead level for the eleven soil samples collected from the CSFA by Penn E&R/USEPA is 1,916 mg/kg. This average lead concentration does not include the anomalously high result generated for the original analysis of duplicate sample CSFA-40 for the reasons detailed in Section 2.0.

Penn E&R conducted a focused risk assessment assuming constant exposure to lead at the average concentration. In evaluating this scenario, Penn E&R made the following conservative assumptions:

1. Employees would not be exposed to dust concentrations above the American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Value (TLV) of 10 mg/m³ of total dust while on site. Under normal excavating and construction operations, this limit is very rarely exceeded for short periods of time, and almost never exceeded for an entire 8-hour period. In addition, a dust concentration of 10 mg/m³ would create a significant dust cloud over the entire site. Construction activities being completed at the site, both within and outside the limits of the CSFA, must ensure that this TLV for dust is not exceeded through periodic wetting of the areas being excavated.
2. All of the dust that becomes airborne is assumed to be respirable. This is highly unlikely given that some portion of the dust generated will be too large to inhale.
3. All of the dust generated while working in the CSFA would contain the average concentration of lead found in the CSFA (1,916 mg/kg). Again, this is highly unlikely given the concentrations found throughout the site, and construction work practices.
4. Previous personal air sampling performed over a two day period during the implementation of the Remedial Design Site Characterization activities, which are discussed in Section 2.0, demonstrated that on-site workers in the CSFA were not

overexposed to dust or lead during these filed operations. In addition, the ratio of lead to total dust in these air samples was significantly less than the ratios used for this focused risk assessment.

Using these assumptions, the highest concentration of airborne lead that personnel could be exposed to while working within the limits of the CSFA would be 19.2 ug/m³. This was calculated as follows:

$$\frac{10 \text{ mg soil dust}}{\text{m}^3} \times \frac{1000 \text{ ug}}{\text{mg}} \times \frac{1,916 \text{ mg lead}}{\text{kg soil dust}} \times \frac{1 \text{ kg}}{1,000,000 \text{ mg}} = 19.2 \frac{\text{ug lead}}{\text{m}^3}$$

$$(\text{TLV} \times \text{Conversion} \times \text{Avg. Pb Concentration} \times \text{Conversion} = \text{Concentration})$$

This calculated airborne lead level of 19.2 ug/m³, is below the OSHA action level of 30 ug/m³. Therefore, no adverse exposure to personnel working in the CSFA is expected.

Based on the information provided above, our analysis of the soil samples collected from CSFA and previous personal exposure monitoring results, the level of lead in the materials in the CSFA is not expected to result in any adverse health effects to on-site worker's completing the planned soil excavation activities. To ensure that the planned activities do not generate dust in excess of the TLV the measures outlined below in Section 6.3 will be implemented. Also, as discussed in Section 6.6, Penn E&R's on-site Safety Coordinator will conduct continuous monitoring of all on-site activities using a Mini-Ram to determine total dust concentrations. If dust levels exceed 5 mg/m³ or visible dust is observed, work will cease, and dust control measures will be implemented. In addition to the continuous air monitoring for dust levels and to confirm the results of our focused risk assessment and previous air monitoring results from this area, personal air monitoring for lead will be conducted for the first two days of the soil excavation activities. The personal air monitor's will be placed on personnel most likely to be exposed.

6.2.3.2 Volatile Organic Compounds

A few volatile organic compounds were detected in the soil samples collected from the CSFA. However, the concentrations at which these compounds were detected were well below both their non-residential Act 2 direct contact MSCs and USEPA RBCs. Therefore, the possible presence of volatile organic compounds in the CSFA does not present an unacceptable risk to on-site workers. A photoionization detector will be used on-site to continuously screen for the possible presence of volatile organic vapors in the ambient air. If levels exceed 5 ppm at any point, operations will cease, and the Corporate Health and Safety Officer will evaluate what, if any, upgrades to personal protective equipment may be required before work can commence.

6.2.3.3 Semivolatile Organic Compounds

A number of semivolatile organic compounds were detected in the soil samples collected from the CSFA. The compounds benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, indeno(1,2,3-cd)pyrene, and dibenzo(a,h)anthracene were

detected above either their USEPA RBCs or non-residential Act 2 MSCs. Semi-volatile compounds such as those listed above may be attached to dust particles, and will be controlled in the same manner as lead. The concentrations present in samples would indicate that they pose less of a risk to on-site worker's than lead. Due to the nature of these materials (high melting and boiling points), it is not expected that they will become airborne and pose a threat to on-site personnel. However, to avoid contact with these materials, personnel working within the exclusion zone and who have the possibility of contacting the fill material will be required to wear Modified Level D personnel protective equipment (i.e., long sleeves and pants, boots, gloves, tyvek, hard hats and safety glasses).

6.2.3.4 PCBs

The PCB aroclor 1254 was detected above its USEPA RBC but not its PADEP Act 2 non-residential direct contact MSC in one of the seven samples in which PCBs were tested. The presence of PCBs above USEPA RBCs in just one of the seven samples suggest that PCBs may not be indicative of the chemical makeup of the fill material in the CSFA. Also, the concentration of the PCB aroclor present in the one sample would indicate that the possible presence of PCBs pose less of a risk to on-site worker's than lead. PCBs may be attached to dust particulates and will therefore be controlled in the same manner as lead. Due to the nature of PCBs (low vapor pressure), it is not expected that they will become airborne and pose a threat to on-site personnel. However, to avoid contact with these materials, personnel working within the exclusion zone and who have the possibility of contacting the fill material will be required to wear Modified Level D personnel protective equipment (i.e., long sleeves and pants, boots, gloves, tyvek, hard hats and safety glasses).

6.2.3.5 Other Chemicals Hazards

Small quantities of acetone and nitric acid will be utilized for decontaminating sampling equipment. Gasoline/diesel fuel may be stored on-site in small containers (i.e., less than 50-gallons). Proper handling of these materials will be followed to prevent unacceptable risks to on-site personnel. MSDS for these chemicals are also included in Attachment 6E.

6.3 General Safety Procedures

6.3.1 Security/Work Zones

A high visibility fence is already located around the perimeter of the CSFA. This fence will be maintained throughout the excavation and backfilling operations. The areas within the fence will be considered the exclusion zone. Only personnel who are 40-hour OSHA trained and have reviewed the site-specific Health and Safety Plan, and which are required to implement the remedy, will be allowed inside the exclusion zone. No trucks that will be used to transport the fill off-site for disposal will be allowed within the exclusion zone. No fill material removed from the CSFA will be placed outside of the fence at any time. The loading and truck turnaround area will be considered the Contamination Reduction Zone (CRZ). Personal decontamination stations

will be setup and completed on the decontamination pad, which is located within the CRZ. The location of the high visibility fence, the exclusion zone and the CRZ is shown on Figure 6-3.

6.3.2 Site Safety Meetings

The on-site Health and Safety Coordinator and Corporate Health and Safety Officer will meet on-site with all personnel prior to the initiation of remedial activities in the CSFA. All personnel will be required to read this site-specific health and safety plan (SSHASP) and sign the Safety Briefing Form included in Attachment 6C. This meeting will also be used to familiarize all personnel with the site, the different work zones, and to discuss and explain the remedial activities to be implemented.

Daily safety meetings will also be held at the start of each workday. These daily safety meetings will be used to discuss the days planned activities, any problems or concerns that may have arisen during the previous days work, current weather conditions, monitoring results from the previous days activities, and any changes to this SSHASP. The on-site Health and Safety Officer will conduct these daily safety meetings.

6.3.3 Personal Protective Equipment

All on-site personnel will be required to wear steel toed boots, hard hats and standard work clothes (i.e., long pants and sleeved shirts). Personnel who enter the exclusion zone will be required to wear hard hats, standard work clothes, steeled toed boots, safety glasses and hearing protection. Personnel that may come in contact with materials in the CSFA will, in addition to the aforementioned, wear latex/nitrile gloves and tyvek suits. The on-site Health and Safety Coordinator will be responsible for identifying those on-site personnel who are required to upgrade their personnel protective equipment to include latex/nitrile gloves and tyvek.

If volatile organic vapors measured by the PID exceed 5 ppm or dust levels measured by the Mini-Ram exceed 5 mg/m^3 at any time during the remedial activities, work will be stopped immediately. The on-site Health and Safety Coordinator and the Corporate Health and Safety Officer will then evaluate what, if any, upgrades to personnel protective equipment may be required before work can commence again.

6.3.4 Personnel Decontamination

Personnel decontamination will be implemented in two phases as determined by the on-site Health and Safety Coordinator. The first phase will be completed in the exclusion zone and will include the removal of any gross contamination such as mud using brushes or other similar devices. All mud or other similar material removed will be left in the exclusion zone to be removed with the material excavated from the CSFA. Personnel will then complete any remaining decontamination on the decontamination pad in the CRZ.

The personnel decontamination area will be covered with plastic sheeting and will include wash tubs, brushes, water, soap, paper towels and waste baskets. After entering the personnel

decontamination area, equipment will be dropped, and outer garments such as boots, gloves and tyvek will be washed as required. Boots, if disposable, tyvek and outer gloves will be removed and placed in the waste basket. Personnel will then be required to wash their hands and face prior to leaving the exclusion zone.

Wash/waste waters generated during these decontamination activities will be disposed of along with the truck washwaters (i.e., they will be sprayed on materials removed from the CSFA for dust suppression purposes). The solid waste generated during the decontamination activities will be disposed of off-site with the fill removed from the CSFA.

6.3.5 Housekeeping

All work areas will be maintained in an orderly manner.

6.3.6 Fire Protection

All fuel for heavy equipment will be stored in appropriate containers.

6.3.7 First Aid and Medical Attention

Montgomery Hospital will provide emergency medical attention during the on-site remedial activities.

6.3.8 Tools

All tools and equipment must will be maintained in good working order and fully comply with all OSHA Safety Rules and Health Regulations for the construction industry. All equipment will be inspected on a daily basis to ensure that they meet these requirements.

6.3.9 Heavy Equipment

All heavy equipment will be inspected on a daily basis to ensure that it is in good working order. All equipment will be operated by only qualified and experienced operators.

6.3.10 Excavations

All excavations will be maintained in accordance with OSHA regulations. All excavations will be secured at the end of each day to prevent anybody from falling into the excavations. No one will be allowed in any excavation that is deeper than 4 feet unless it has been shored or the walls of the excavation have been sloped appropriately to ensure that a cave-in will not occur.

6.3.11 Dust Suppression

A water truck will be on-site throughout the duration of the remedial activities. The water truck will be used to periodically wet down the CSFA, the temporary access road, the asphalt

driveway, and Horizon Drive and Renaissance Boulevard. If any visual signs of dust are generated during excavation or grading activities in the CSFA, work will be immediately stopped and the area will be thoroughly wet down.

6.4 Hazard Summary

<u>Apparent Hazard</u>	<u>Type of Facility</u>	<u>Status of Facility</u>
Serious _____	Mfg. _____	Active _____
Moderate _____	Dump <u>X</u>	Inactive <u>X</u>
Low <u>X</u>	Landfill _____	Unknown _____
None _____	Open _____	
Unknown _____	Warehouse _____	
	Gasoline Station _____	

<u>Waste Type (s)</u>	<u>Waste Characteristics</u>	<u>Type/Form of Hazard</u>
Gas _____	Toxic _____	Dust <u>X</u>
Liquid _____	Corrosive _____	Liquid _____
Sludge _____	Ignitable _____	Fumes _____
Solid <u>X</u>	Volatile _____	Vapors _____
Unknown _____	Radioactive _____	Contact <u>X</u>
Other <u>Soil</u>	Reactive _____	Respiratory _____
	Unknown _____	Other _____
	Other <u>1</u>	IDLH _____

6.5 Personal Protective Equipment

Level of Protection: A _____ B _____ C _____ D X

¹ As indicated above, lead, arsenic, several polynuclear aromatic hydrocarbons and the PCB aroclor 1254 are present in the fill at concentrations that exceed their USEPA RBCs.

Personal protective equipment required to be worn during the remedial activities in the CSFA is detailed in Section 6.3.3 above.

6.6 Monitoring /Surveillance Equipment

HNU/PID	<u> X </u>	Metal Detector	<u> </u>
OVA/GC	<u> </u>	Explosimeter	<u> </u>
Drager Tubes	<u> </u>	O ₂ Detector	<u> </u>
Tri-Tector	<u> </u>	Radiation Survey Meter	<u> X </u>
Mini-Ram	<u> X </u>		

In order to ensure that the planned construction activities in the CSFA do not generate dust in excess of the TLV, the on-site Health and Safety Coordinator will complete continuous monitoring for total dust with a Mini-Ram and for total volatile organic vapors with a photoionization detector. Although measurements will be collected throughout the CSFA, monitoring for organic vapors and dust will focus on areas located immediately downwind of areas being excavated and the truck loading area. If dust is being generated above 5 mg/m³, work will be immediately stopped and appropriate dust control measures will be implemented. In addition, if volatile organic vapors exceed 5 ppm at any time, work will be stopped until the Corporate Health and Safety Coordinator can determine what, if any, upgrades of personnel protective equipment may be required.

In addition to the continuous air monitoring for dust levels and to confirm the results of our focused risk assessment and previous air monitoring results for the CSFA, personal air monitoring for lead will be conducted for the first two days of the soil excavation activities. The air monitor's will be placed on personnel most likely to be exposed. The air samples will be analyzed for lead on an accelerated 24-hour turnaround. The samples will be analyzed by Philip Analytical Services, an American Industrial Hygiene Association accredited laboratory, using NIOSH Method 7300. The Corporate Health and Safety Officer will review the air monitoring results and, if required, will make appropriate modifications to this SSHASP. These results will also be reviewed with EPA to agree upon whether or not continued air monitoring for lead is required.

6.7 EMERGENCY PHONE NUMBERS

Local Emergency

<u>Phone Numbers</u>	<u>Location</u>	<u>Phone</u>	<u>Notified</u>
Fire	610-265-5533	911	To be notified prior to start of work
Police	610-265-3232	911	To be notified prior to start of work
Ambulance	610-265-5533	911	To be notified prior to start of work
Hospital	Montgomery Hospital, 1301 Powell Street, Norristown		
	610-270-2000 (general) or 610-270-2060 (emergency)		

Chemical trauma capability? Yes

DIRECTIONS TO HOSPITAL - See Figure 6-4

Go out of the main entrance for the 2301/2201 Property onto Horizon Drive. Follow Horizon Dr. to Church Street. Make a left onto Church Street and proceed to Henderson Road. Make a right onto Henderson Road and proceed to Rt. 202. Make a right onto Rt. 202 North towards Norristown. After crossing bridge into Norristown, proceed straight on Markley Street. At fourth traffic light, make a right onto Fornance Street. Proceed to next light and make a right onto Powell Street. The hospital is located at the intersection of Powell and Fornance Streets.

Route Verified by Sean M. Gallagher

Additional Emergency Phone Contacts

PECO	(800) 841-4141
Chemtrec	(800) 424-9300
TSCA Hotline	(800) 424-9065, (202) 544-1404
AT&F (explosives info.)	(800) 424-9555
National Response Center	(800) 424-8802
Pesticide Information Service	(800) 845-7633
RCRA Hotline	(800) 424-9346
CMA Chemical Referral Center	(800) 262-8200
National Poison Control Center	(800) 942-5956
U.S. DOT	(202) 366-0656 (Day Only)
PADEP	(610)-832-6000
U.S. EPA Hotline	(800) 424-9346

6.8 Safety Equipment Checklist

Personal Protection

<u> </u>	Respirator
<u> </u>	Cartridges
<u> </u>	Type
<u> X </u>	Safety Boots
<u> </u>	Rubber Boots
<u> X </u>	Coveralls (tyvek)
<u> </u>	Coveralls (cotton)
<u> X </u>	Hard Hat
<u> </u>	PVC Rain Gear
<u> X </u>	Safety Glasses
<u> X </u>	Nitrile/Latex Gloves
<u> </u>	Viton Gloves
<u> X </u>	Disposable Booties
<u> X </u>	Disposable Gloves
<u> X </u>	Hearing Protection (when sound levels exceed 90 DBA)
<u> </u>	SCBA
<u> </u>	Cascade System

Monitoring and Surveillance

<u> </u>	Radiation
<u> </u>	O ₂
<u> </u>	OVA
<u> </u>	Explosimeter
<u> X </u>	HNU
<u> </u>	TLD Badges
<u> </u>	Metal Detector
<u> X </u>	Mini-Ram

Decon Equipment

<u> X </u>	Tub
<u> X </u>	Water
<u> X </u>	Garbage Can w/liner
<u> </u>	Bucket
<u> X </u>	Plastic Garbage Bags
<u> </u>	Detergent
<u> </u>	Hand Soap

Miscellaneous

First Aid Kit	<u> X </u>
Water	<u> X </u>
Fire Extinguisher	<u> X </u>

6.9 General Safety Rules and Regulations

Safety of all employees and subcontractor personnel is our number one goal. Therefore, the following rules and regulations will apply to all work and personnel on-site.

1. PERSONAL PROTECTIVE EQUIPMENT:

- a. Hard hats must be worn at all times on the job.
- b. If required, safety glasses and/or applicable added face protection must be worn at all times on the job.
- c. The wearing of safety shoes is required. The wearing of canvas shoes, moccasins, loafers, house slippers, or any open-toed shoes on the job is prohibited.

- d. Approved hearing protection must be provided in posted high noise level areas.
- e. Approved respirators must be worn in areas of harmful dusts, gases, mists and vapors. The on-site Health and Safety Coordinator will be responsible for identifying when any such protective equipment is required.
- f. Safety belts, lanyards, lifelines and/or safety nets must be utilized in accordance with federal standards.
- g. Employees must be properly clothed for their work. Full-length trousers and long sleeve shirts are required in all areas.
- h. Hair length must conform to the safety requirements of the respective jobs and work areas.

2. HOUSEKEEPING:

- a. All work areas, passageways and walkways must be maintained in an orderly manner.
- b. Waste of all kinds, including empty bottles, shall be placed in proper containers provided for same.
- c. Scrap lumber must be piled orderly and projecting nails must be pulled or bent over to eliminate a hazard.

3. FIRE PROTECTION AND PREVENTION:

- a. "NO SMOKING" must be observed throughout the job site except in designated areas.
- b. All combustible or flammable materials must be stored, dispensed and used properly.
- c. Adequate fire protection and prevention must be maintained on-site.

4. FIRST AID AND MEDICAL ATTENTION:

- a. First aid and medical attention will only be provided by persons with valid first aid training from the U.S. Bureau of Mines, the American Red Cross or equivalent training that can be verified by documentary evidence on the site. In case of an emergency the local emergency service will be contacted to provide emergency medical attention.

5. HANDLING AND STORAGE OF MATERIALS:

- a. Materials must be stocked, racked, blocked, or otherwise secured to prevent sliding, falling, or collapse.
- b. Rigging equipment must be used properly and inspected.
- c. Safe working load must be marked clearly on all hoists, slings, chains, etc.

6. TOOLS (HAND, POWER - AND POWER - ACTUATE):

- a. All mechanical safeguards must be in use.
- b. All tools must be grounded properly or double insulated.
- c. All tools must be inspected and maintained properly including cords and wiring.
- d. All licensing laws and ordinances must be complied with.

7. ELECTRICAL:

- a. All electrical wiring and equipment must comply with NFPA, NEC and ANSI standards.
- b. All electrical wiring will be inspected daily for any defects.

8. LADDERS AND SCAFFOLDS:

- a. All ladders and scaffolds (including ropes and cables) must be inspected regularly and maintained in good condition.
- b. Scaffolds must be provided with guard-rails, mid-rails, and toe-boards.
- c. Straight ladders must be provided with safety feet and properly secured to prevent slipping, falling or sliding.

9. FLOOR AND WALL OPENINGS AND STAIRWAYS:

- a. All must be guarded properly.
- b. All stairs or platforms having four or more risers must be guarded by standard stair rail.
- c. Open-sided platforms six feet above the ground or floor must be guarded.

10 CRANES, DERRICKS AND HEAVY EQUIPMENT:

- a. All equipment must be maintained properly and inspected including cables, sleeves, slings, chains, hooks, eyes and the posting of load capacities, hand signals, operating speeds, and special instructions.
- b. Where applicable, approved rollover protection must be provided for graders, dozers, fork lifts, scrapers, tractors, etc.
- c. Noise arresters and back-up alarms must be provided, and operational.

11. MOTOR VEHICLES:

- a. All motor vehicles must have qualified operators.
- b. All vehicles must be inspected and maintained regularly and weigh limits and load sizes controlled.

12. EXCAVATIONS - SHORING, TRENCHING AND FORMS:

- a. Ladders, barricades, shoring, forms, ramps, etc., must be in accordance with OSHA regulations.

13. SIGNS AND TAGS:

- a. Signs that warn of hazards must be visible and posted properly.
- b. Accident prevention tags must be used as a temporary means of warning employees of an existing hazard.

14. EXPLOSIVE BLASTING:

- a. State regulations must be observed.
- b. Prior approval must be obtained from the Safety and Industrial Hygiene Department and the appropriate Operating Superintendent.

15. FLAMMABLE GASES AND LIQUIDS:

- a. Proper storage practices must be maintained.
- b. Fire protection must meet all standards for storage areas.
- c. All containers and storage areas must be identified properly.

The following regulations must be complied with:

1. Permit for Cutting and Welding with Gas or Electric Equipment.
2. Permit for Entering Tank, Manhole, Pipeline, Pit, or Closed Vessel.
3. Railroad and Blue Flag Regulations.
4. Fire Boxes and Alarms.
5. Mobile Equipment Operating Rules.
6. Electrical Lockout Procedure.

TABLE 6-1A

SUMMARY OF ANALYTICAL RESULTS
FOR SOIL SAMPLES COLLECTED FROM
THE CINDERSLAG FILL AREA
COMPARED TO USEPA REGION III RBCs/SSLs

ANALYTICAL PARAMETERS ⁽¹⁾	SAMPLE DESIGNATION/ANALYTICAL RESULTS ⁽²⁾								GENERIC USEPA RBC ⁽⁴⁾ (INDUSTRIAL)	GENERIC USEPA SSL ⁽⁴⁾ (DAF-20)
	FT-3	CSFA-22	CSFA-23	CSFA-40 ⁽³⁾	CSFA-24	CSFA-25	CSFA-26	CSFA-27		
Volatile Organics:										
Chloromethane	<0.013	<0.017	<0.027	<0.018	<0.023	<0.018	0.005 J	<0.019	440	0.01
Trichlorofluoromethane	<0.013	<0.017	<0.027	<0.018	0.004 J	<0.018	<0.015	<0.019	61,000	2.3
Acetone	<0.013	0.13	0.033	0.019	0.010 JB	0.09	0.03	<0.019	20,000	0.25
Methylene Chloride	0.012 JB	0.005 JB	0.006 JB	0.003 JB	0.003 JB	0.003 JB	0.002 JB	0.002 JB	760	0.019
2-Butanone	<0.013	0.016 J	<0.027	<0.018	<0.023	<0.018	<0.015	<0.019	1.2 x 10 ⁵	0.79
Benzene	<0.013	0.009 J	0.028	0.003 JB	<0.023	0.003 J	0.005 J	<0.019	100	0.0018
Toluene	<0.013	0.088	0.005 J	<0.018	<0.023	0.17	0.059	<0.019	41,000	0.88
Semivolatile Organics:										
2-Methylnaphthalene	<0.44	<0.43	0.073 J	0.17 J	<0.41	<0.45	<0.42	<3.4	41,000	2.2
Acenaphthene	<0.44	0.078 J	<0.45	0.057 J	<0.41	<0.45	<0.42	<3.4	12,000	10
Acenaphthylene	<0.44	0.17 J	0.16 J	0.20 J	<0.41	<0.45	<0.42	<3.4	NSA	NSA
Acetophenone	NA	<0.43	<0.45	0.043 J	<0.41	<0.45	<0.42	<3.4	20,000	0.0002
Anthracene	<0.44	0.49	0.25 J	0.30 J	0.20 J	0.058 J	<0.42	2.1 J	61,000	47
Benzaldehyde	NA	0.050 J	0.26 J	0.16 J	<0.41	<0.45	<0.42	<3.4	20,000	NSA
Benzo (a) anthracene	0.25J	2	0.71	0.87	1.5	0.19 J	0.10 J	12	7.8	1.5
Benzo (a) pyrene	0.24 JB	2.6	0.91	1	2.1	0.24 J	0.14 J	12	0.78	0.37
Benzo (b) fluoranthene	0.34 J	3.1	0.76	1.1	2.5	0.36 J	0.17 J	23	7.8	4.5
Benzo (g,h,i) perylene	0.24 JB	1.3	0.40 J	0.44	<0.41	<0.45	<0.42	6.7	NSA	NSA
Benzo (k) fluoranthene	0.079J	2.5	1.1	0.8	2.7	0.20 J	0.16 J	16	78	45
bis (2-Ethylhexyl) phthalate	0.39 J	2.5	0.65	1.3	0.66	0.24 J	0.36 J	1.4 J	410	2,900
Butylbenzylphthalate	<0.44	0.048 J	<0.45	<0.43	<0.41	<0.45	<0.42	<3.4	41,000	1,700
Carbazole	<0.44	0.25 J	0.12 J	0.14 J	0.12 J	<0.45	<0.42	0.73 J	290	0.47
Chrysene	0.27 J	3.2	0.77	0.97	2	0.23 J	0.16 J	16	780	150
Dibenzo (a,h) anthracene	0.074 J	0.8	0.26 J	0.28 J	0.73	0.094 J	0.05 J	4.2	0.78	1.4
Dibenzofuran	<0.44	0.059 J	0.11 J	0.15 J	<0.41	<0.45	<0.42	<3.4	820	0.77
Di-n-butylphthalate	<0.44	<0.43	<0.45	0.057 J	0.049 J	<0.45	<0.42	<3.4	20,000	500
Di-n-octylphthalate	<0.44	<0.43	<0.45	<0.43	0.41 J	<0.45	<0.42	<3.4	4,100	2.4 x 10 ⁵
Fluoranthene	0.34 J	4.0 D	1.3	1.8	2.1	0.31 J	0.17 J	21	8,200	630
Fluorene	<0.44	0.11 J	0.064 J	0.10 J	<0.41	<0.45	<0.42	<3.4	8,200	14
Indeno (1,2,3-cd)pyrene	0.21 J	2	0.66	0.72	1.8	0.21 J	0.13 J	10	7.8	13
Naphthalene	<0.44	0.084 J	0.59	0.83	<0.41	<0.45	<0.42	<3.4	4,100	0.015
N-nitrosodiphenylamine (1)	<0.44	0.17 J	<0.45	<0.43	<0.41	<0.45	<0.42	<3.4	1200	0.76
Phenanthrene	0.13 J	2.3	0.95	1	0.76	0.16 J	0.061 J	11	NSA	NSA
Phenol	<0.44	<0.43	<0.45	0.059 J	<0.41	<0.45	<0.42	<3.4	1.2 x 10 ⁵	13
Pyrene	0.31 J	2.8	1.1	1.5	1.7	0.30 J	0.16 J	20	6,100	68
Inorganics:										
Aluminum	13,800	15,000	10,200	10700	5,410	14,300	9730	13,000	2 x 10 ⁵	NSA
Antimony	7.4 B	25.3 N	8.0 B N	9.3 B N	4 B N	25.8 N	6.6 B N	6.4 B N	82	1.3
Arsenic	19.8	24.3 N	14.1 N	17.3 N	21.7 N	39.4 N	39.9 N	20.3 N	3.8	0.026
Barium	996	449 *	745 *	1460 *	455 *	626 *	534 *	425 *	14,000	210
Beryllium	0.54 B	0.46 B	0.47 B	0.47 B	0.38 B	0.37 B	0.28 B	0.56 B	410	120
Cadmium	8.2	8.6 *	7.1 *	8.1 *	5.1 *	8.1 *	5.8 *	31 *	100	2.7
Calcium	29400	13400 *	20600 *	21600 *	9400 *	28900 *	20400 *	39200 *	NSA	NSA
Chromium	67.5	99.7 N*	67.3 N*	63.6 N*	71.8 N*	196 N*	141 N*	46.6 N*	610	4.2
Cobalt	16.4	18.3	10.9 B	10.6 B	16.5	21.7	17.7	10.2 B	4,100	NSA
Copper	401	428 *	740 *	911 *	249 *	418 *	266 *	225 *	8,200	1,100
Iron	75900	115000 *	76900 *	66600 *	151000 *	128000 *	85400 *	62100 *	61,000	NSA
Lead	2390	6230 *	1490 *	25000/1010⁽⁵⁾	619 *	1920 *	808 *	1870 *	750	NSA
Magnesium	4690	3870 *	4480 *	5280 *	1740 *	12800 *	5530 *	3450 *	NSA	NSA
Manganese	744	740	4560	4930	869	832	638	975	4,100	9.5
Mercury	0.25	0.3	1.2	0.87	3.9	0.42	0.18	0.16	20	NSA
Nickel	92	72.4	65	51.7	70.7	175	100	38.4	4,100	NSA
Potassium	2100	867 B E	762 B E	783 B E	404 B E	1110 B E	946 B E	734 B E	NSA	NSA
Selenium	<0.72	4.1	4	4	4.4	3.2	1.9	2.3	1,000	1.9
Silver	3.1	1.4 B	4.7	7	1.6 B	1.3 B	1.8 B	2.0 B	1,000	3.1
Sodium	<52.5	<41.9	<41.4	<42.4	<40.5	<44.1	<42.5	<40.5	NSA	NSA
Thallium	0.78 B	17.3 N	11.6 N	9.7 N	25.8 N	16.7 N	13.2 N	8.0 N	14	0.36
Vanadium	28	24.2	31	38.1	20	23.6	17.4	21.4	1,400	510
Zinc	5620	4970	2,890	3580	1000	7280	3880	2,800	61,000	1,400
Cyanide	<1.33	3.3	4.7	3.6	0.6 B	0.79	0.38 B	0.056 U	4,100	15
Sample Collection Depth ⁽⁶⁾	10.5	2-4	4-8	4-8	3-4	0-4	3-6	3-4	----	----

Notes:

- (1) - Each sample was submitted for laboratory analysis of the TCL volatile and semi-volatile organic compounds and the TAL inorganics (including cyanide). Only those compounds which were detected above the laboratory method detection limit (MDL) are shown.
- (2) - All results are in milligrams per kilogram.
- (3) - This is a duplicate of sample CSFA-23
- (4) - United States Environmental Protection Agency, Region III Risk-Based Concentrations and Soil Screening Levels for Soils (5/8/01).
One-tenth of the RBC/SSL for non-carcinogenic compounds are listed.
- (5) - This sample was analyzed twice for lead. The first analysis revealed lead at 25,000 mg/kg and the second analysis of a split from the sample displayed lead at 1,010 mg/kg.
- (6) - Sample collection depths are in feet below the ground surface
- USEPA - United States Environmental Protection Agency
- RBC - Risk-Based Concentration
- SSL - Soil Screening Level
- MSC - Medium-Specific Concentration
- NSA - No standard available
- NA - Not analyzed
- * - The results for the sample and the laboratory duplicate results are not within control limits.
- B (Inorganics) - Indicates that the analyte was analyzed for and the reported value was obtained from a reading that was less than the Contract Required Detection Limit but greater than or equal to the Instrument Detection Limit.
- B (Organics) - This flag is used when the analyte is found in the associated blank as well as the sample. It indicates probable blank contamination and warns the data user to take appropriate action.
- D - Indicates that the sample was re-analyzed at a higher dilution factor.
- B - Indicates an estimated value for metals analysis.
- J - Indicates an estimated value.
- N - This flag indicates the sample spike recovery is outside of control limits.
- <10 - Compound was not detected above the detection limit shown
- Bold - Compound was detected above its EPA RBC and/or SSL.

TABLE 6-2

**SUMMARY OF ANALYTICAL RESULTS
FOR SOIL SAMPLES COLLECTED FROM
THE CINDER/SLAG FILL AREA BY THE USEPA**

ANALYTICAL PARAMETERS ⁽¹⁾	SAMPLE DESIGNATION/ANALYTICAL RESULTS ⁽²⁾					GENERIC USEPA RBC ⁽⁴⁾ (INDUSTRIAL)	GENERIC USEPA SSL ⁽⁴⁾ (DAF-20)
	C0252	C0253	C0254	C0255	C0256 ⁽³⁾		
<i>Volatile Organics:</i>							
Trichlorofluoromethane	<0.012	<0.013	0.001J	<0.011	<0.011	61,000	2.3
Acetone	0.004 BJ	0.005BJ	0.003BJ	0.064B	0.038B	20,000	0.25
Carbon Disulfide	0.002 J	0.004J	0.004J	0.002J	0.002J	20,000	1.9
Methylene Chloride	0.04 B	0.059B	0.0069B	0.040B	0.04B	760	0.019
2-Butanone	0.002 BJ	0.003BJ	0.002BJ	0.006BJ	0.004BJ	1.2 x 10 ⁵	0.79
Cyclohexane	0.002 J	0.005J	<0.012	0.005J	0.004J	NSA	NSA
Benzene	<0.012	<0.013	<0.012	0.015	0.015	100	0.0018
Styrene	<0.012	<0.013	<0.012	0.002J	0.002J	41,000	5.7
Toluene	<0.012	0.005J	0.003J	<0.028	0.03	41,000	0.88
1,2,4,- Trichlorobenzene	0.001 BJ	<0.013	0.001BJ	<0.011	<0.011	2,000	0.75
Xylene (total)	<0.012	<0.013	0.002BJ	0.003BJ	0.004BJ	4.1 x 10 ⁵	23
1,2-Dibromo-3-chloropropane	<0.012	<0.013	0.001BJ	<0.011	<0.011	4.1	0.00087
<i>Semivolatile Organics:</i>							
2-Methylnaphthalene	<12	0.11J	15DJ	18J	22J	4,100	2.2
Acenaphthene	<12	0.18J	<12	15J	22J	12,000	10
Acenaphthylene	<12	0.74DJ	6.8DJ	180DJ	370DJ	NSA	NSA
Acetophenone	1.9 BJ	0.14J	1.7DBJ	4.9BJ	<110	20,000	0.0002
Anthracene	3.5 J	1.3 DJ	6.6DJ	430DJ	810DJ	61,000	47
Benzaldehyde	<12	0.18J	<12	<66	<110	20,000	NSA
Benzo (a) anthracene	18	6.3D	17DJ	950D	2,100D	7.8	1.5
Benzo (a) pyrene	14	6.7DJ	13DJ	760D	1,700D	0.78	0.37
Benzo (b) fluoranthene	16	6D	12DJ	650DJ	1,500D	7.8	4.5
Benzo (g,h,i) perylene	15	6.8D	11DJ	590DJ	1,200D	NSA	NSA
Benzo (k) fluoranthene	15	5.5D	14DJ	660D	1,400D	78	45
bis (2-Ethylhexyl) phthalate	1.5 J	4.3D	2DJ	5.3J	100DJ	410	2,900
Carbazole	1.3 J	0.59DJ	1.8DJ	52DJ	74DJ	290	0.47
Chrysene	24	7.3D	16DJ	870D	1,800D	780	150
Dibenzo (a,h) anthracene	4.6J	2.1DJ	3.4DJ	180DJ	380DJ	0.78	1.4
Dibenzofuran	<12	0.19J	8.4DJ	56DJ	91DJ	820	0.77
Di-n-butylphthalate	<12	0.092J	<12	<66	<110	20,000	500
Di-n-octylphthalate	<12	<4.2	<12	<66	<110	4,100	2.4 X 10 ⁵
Fluoranthene	35	9.9D	33DJ	2,600D	5,300D	8,200	630
Fluorene	<12	0.29DJ	2.2DJ	150DJ	260DJ	8,200	14
Indeno (1,2,3-cd)pyrene	<12	5.9D	10DJ	540DJ	1,200D	7.8	13
Naphthalene	<12	0.49DJ	180D	36DJ	53J	4,100	0.015

TABLE -2 - CONTINUED

SUMMARY OF ANALYTICAL RESULTS
FOR SOIL SAMPLES COLLECTED FROM
THE CINDER/SLAG FILL AREA BY THE USEPA

ANALYTICAL PARAMETERS ⁽¹⁾	SAMPLE DESIGNATION/ANALYTICAL RESULTS ⁽²⁾					GENERIC USEPA RBC ⁽⁴⁾ (INDUSTRIAL)	GENERIC USEPA SSL ⁽⁴⁾ (DAF-20)
	C0252	C0253	C0254	C0255	C0256 ⁽³⁾		
N-nitrosodiphenylamine (1)	<12	0.27J	<12	<66	<110	1200	0.76
Phenanthrene	19	4.8D	42D	1,000D	1,700D	NSA	NSA
Phenol	<12	0.069J	1.8DJ	6.1J	9J	1.2 x 10 ⁵	13
Pyrene	28	9.1D	24DJ	1,700D	3,400D	6,100	68
4-Methylphenol	<12	1.3J	1.3J	3.6J	<110	1,000	NSA
1,1-Biphenyl	<12	2.9DJ	2.9DJ	5.2J	6.6J	10,000	96
Pesticides/PCBs:							
Heptachlor	0.005	0.00084PJ	<0.002	<0.0019	<0.0019	1.3	0.84
4,4-DDE	0.0011	0.0027PJ	<0.0038	<0.0037	<0.0038	17	35
4,4-DDD	0.0094	0.0019PJ	<0.0038	<0.0037	<0.0038	24	11
4,4-DDT	0.013	<0.0042	<0.0038	0.052DP	<0.0038	17	1.2
Endrin	<0.0041	0.037P	0.092DP	<0.0037	0.016P	61	0.54
Endrin-Ketone	0.051	<0.0042	0.016DJ	0.22D	0.1DP	NSA	NSA
Endrin-Aldehyde	0.0062	<0.0042	5.3DP	0.045P	<0.0038	NSA	NSA
Gamma-Chlordane	0.0021	0.0054P	0.019P	0.025DP	0.0087DPJ	16	0.92
Aldrin	<0.0021	<0.0022	0.0069DPJ	<0.0019	<0.0019	0.34	0.0077
Dieldrin	<0.0041	<0.063	0.27DP	0.0036DPJ	<0.0038	0.36	0.0022
Endosulfan I	<0.0021	<0.0022	<0.02	<0.019	0.0027DPJ	NSA	NSA
Endosulfan II	<0.0041	<0.0042	0.006DPJ	<0.0019	<0.0038	NSA	NSA
Alpha-BHC	<0.0021	<0.0022	<0.02	0.0042DPJ	0.0062DPJ	0.91	0.00089
Delta-BHC	<0.0021	<0.0022	<0.02	<0.019	0.013DJ	3.2	NSA
Aroclor 1254	<0.041	0.89P	5.3DP	<0.037	<0.038	2.9	1.1
Metals:							
Aluminum	8,850	19,900	8,110	5560	5,430	2 x 10 ⁵	NSA
Antimony	<0.96	<1.0	<0.89	<0.88	<0.86	82	1.3
Arsenic	9.2	20.3	26.6	20.8	16.8	3.8	0.026
Barium	413	543	244	272	191	14,000	210
Beryllium	0.28 B	<0.26	0.49 B	<0.22	<0.22	410	120
Cadmium	28.6	4.3	<0.22	19.6	6.4	100	2.7
Calcium	22100	11,300	8,160	15800	9,820	NSA	NSA
Chromium	44.6	79.9	33.1	48.3	35.3	610	4.2
Cobalt	7.8 B	25.7	8.2 B	8.1 B	8.0 B	4,100	NSA
Copper	140	490	140	474	392	8,200	1,100
Iron	26700	153000	49,400	44200	28,200	61,000	NSA
Lead	1280	1,880	1,600	991	629	750	NSA
Magnesium	1810	3,010	1,550	1910	3,150	NSA	NSA

TABLE 6-2 - CONTINUED

SUMMARY OF ANALYTICAL RESULTS
FOR SOIL SAMPLES COLLECTED FROM
THE CINDER/SLAG FILL AREA BY THE USEPA

ANALYTICAL PARAMETERS ⁽¹⁾	SAMPLE DESIGNATION/ANALYTICAL RESULTS ⁽²⁾					GENERIC USEPA RBC ⁽⁴⁾ (INDUSTRIAL)	GENERIC USEPA SSL ⁽⁴⁾ (DAF-20)
	C0252	C0253	C0254	C0255	C0256 ⁽³⁾		
Manganese	446	1,420	1260	365	317	4,100	9.5
Mercury	0.24	0.33	11	5.1	0.85	20	NSA
Nickel	20.2	74.2	28.6	28.4	33.9	4,100	NSA
Potassium	449 B	756 B	970 B	549 B	503 B	NSA	NSA
Selenium	1.8	6.4	3.0	9.1	5.9	1,000	1.9
Silver	0.67 B	1.2 B	0.47 B	0.72 B	<0.43	1,000	3.1
Sodium	444 B	505 B	470 B	425 B	375 B	NSA	NSA
Thallium	<1.4	<1.6	<1.3	2.3	<1.3	14	0.36
Vanadium	15.5	19.5	25.8	10.6 B	15.0	1,400	510
Zinc	1940	3830	706	24900	1540	61,000	1,400

Notes:

(1) Each sample was submitted for laboratory analysis of the TCL volatile and semi-volatile organic compounds, pesticides/PCBs, and the TAL inorganics. Only those compounds which were detected above the laboratory method detection limit (MDL) are shown.

(2) All results are in milligrams per kilogram.

(3) This is a duplicate of sample C0255

(4) United States Environmental Protection Agency, Region III Risk-Based Concentrations and Soil Screening Levels for Soils (5/8/01). One-tenth of the RBC/SSL for non-carcinogenic compounds are listed.

USEPA - United States Environmental Protection Agency

RBC - Risk-Based Concentration

SSL - Soil Screening Level

NSA - No standard available

B (Inorganics) - Indicates that the analyte was analyzed for and the reported value was obtained from a reading that was less than the Contract Required Detection Limit but greater than or equal to the Instrument Detection Limit.

B (Organics) - This flag is used when the analyte is found in the associated blank as well as the sample. It indicates probable blank contamination and warns the data user to take appropriate action.

D - Indicates that the sample was re-analyzed at a higher dilution factor.

P - This flag indicates that there was greater than a 25 percent difference for detected concentrations between the two GC columns.

J - Indicates an estimated value.

N - This flag indicates the sample spike recovery is outside of control limits.

<12 - Compound was not detected above the detection limit shown

Bold - Compound was detected above its EPA RBC and/or SSL.

ATTACHMENT 6E
MATERIAL SAFETY DATA SHEETS

MSDS**Material Safety Data Sheet**

From: Mallinckrodt Baker, Inc.
222 Red School Lane
Phillipsburg, NJ 08865



Mallinckrodt
CHEMICALS



24 Hour Emergency Telephone: 908-669-2151
CHEMTREC: 1-800-424-9300

National Response in Canada
CANUTEC: 613-666-6666

Outside U.S. and Canada
Chemtree: 703-627-3887

NOTE: CHEMTREC, CANUTEC and National Response Center emergency numbers to be used only in the event of chemical emergencies involving a spill, leak, fire, exposure or accident involving chemicals.

All non-emergency questions should be directed to Customer Service (1-800-582-2537) for assistance.

LEAD METAL

MSDS Number: L2347 --- Effective Date: 11/17/99

1. Product Identification

Synonyms: Granular lead, pigment metal; C.I. 77575

CAS No.: 7439-92-1

Molecular Weight: 207.19

Chemical Formula: Pb

Product Codes:

J.T. Baker: 2256, 2266

Mallinckrodt: 5668

2. Composition/Information on Ingredients

Ingredient	CAS No	Percent	Hazardous
Lead	7439-92-1	95 - 100%	Yes

3. Hazards Identification

Emergency Overview

POISON! DANGER! MAY BE FATAL IF SWALLOWED OR INHALED. CAUSES IRRITATION TO SKIN, EYES AND RESPIRATORY TRACT. NEUROTOXIN. AFFECTS THE GUM TISSUE, CENTRAL NERVOUS SYSTEM, KIDNEYS, BLOOD AND REPRODUCTIVE SYSTEM. POSSIBLE

CANCER HAZARD. MAY CAUSE CANCER BASED ON ANIMAL DATA. Risk of cancer depends on duration and level of exposure.

J.T. Baker SAF-T-DATA^(tm) Ratings (Provided here for your convenience)

Health Rating: 3 - Severe (Life)

Flammability Rating: 0 - None

Reactivity Rating: 0 - None

Contact Rating: 1 - Slight

Lab Protective Equip: GOGGLES; LAB COAT; VENT HOOD; PROPER GLOVES

Storage Color Code: Blue (Health)

Potential Health Effects

Inhalation:

Lead can be absorbed through the respiratory system. Local irritation of bronchia and lungs can occur and, in cases of acute exposure, symptoms such as metallic taste, chest and abdominal pain, and increased lead blood levels may follow. See also Ingestion.

Ingestion:

POISON! The symptoms of lead poisoning include abdominal pain and spasms, nausea, vomiting, headache. Acute poisoning can lead to muscle weakness, "lead line" on the gums, metallic taste, definite loss of appetite, insomnia, dizziness, high lead levels in blood and urine with shock, coma and death in extreme cases.

Skin Contact:

Lead and lead compounds may be absorbed through the skin on prolonged exposure; the symptoms of lead poisoning described for ingestion exposure may occur. Contact over short periods may cause local irritation, redness and pain.

Eye Contact:

Absorption can occur through eye tissues but the more common hazards are local irritation or abrasion.

Chronic Exposure:

Lead is a cumulative poison and exposure even to small amounts can raise the body's content to toxic levels. The symptoms of chronic exposure are like those of ingestion poisoning; restlessness, irritability, visual disturbances, hypertension and gray facial color may also be noted.

Aggravation of Pre-existing Conditions:

Persons with pre-existing kidney, nerve or circulatory disorders or with skin or eye problems may be more susceptible to the effects of this substance.

4. First Aid Measures

Inhalation:

Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult,

give oxygen. Get medical attention.

Ingestion:

Induce vomiting immediately as directed by medical personnel. Never give anything by mouth to an unconscious person. Get medical attention.

Skin Contact:

Immediately flush skin with plenty of soap and water for at least 15 minutes. Remove contaminated clothing and shoes. Get medical attention. Wash clothing before reuse. Thoroughly clean shoes before reuse.

Eye Contact:

Immediately flush eyes with plenty of water for at least 15 minutes, lifting lower and upper eyelids occasionally. Get medical attention immediately.

5. Fire Fighting Measures

Fire:

Not considered to be a fire hazard. Powder/dust is flammable when heated or exposed to flame.

Explosion:

Not considered to be an explosion hazard.

Fire Extinguishing Media:

Use any means suitable for extinguishing surrounding fire. Do not allow water runoff to enter sewers or waterways.

Special Information:

In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode. Can produce toxic lead fumes at elevated temperatures and also react with oxidizing materials.

6. Accidental Release Measures

Ventilate area of leak or spill. Wear appropriate personal protective equipment as specified in Section 8. Spills: Sweep up and containerize for reclamation or disposal. Vacuuming or wet sweeping may be used to avoid dust dispersal. US Regulations (CERCLA) require reporting spills and releases to soil, water and air in excess of reportable quantities. The toll free number for the US Coast Guard National Response Center is (800) 424-8802.

7. Handling and Storage

Keep in a tightly closed container, stored in a cool, dry, ventilated area. Protect against physical damage. Isolate from incompatible substances. Areas in which exposure to lead metal or lead compounds may occur should be identified by signs or appropriate means, and access to the area should be limited to authorized persons. Containers of this material may be hazardous when empty since they retain product residues (dust, solids);

observe all warnings and precautions listed for the product.

8. Exposure Controls/Personal Protection

Airborne Exposure Limits:

For lead, metal and inorganic dusts and fumes, as Pb:

-OSHA Permissible Exposure Limit (PEL): 0.05 mg/m³ (TWA)

For lead, elemental and inorganic compounds, as Pb:

-ACGIH Threshold Limit Value (TLV): 0.05 mg/m³ (TWA), A3 animal carcinogen

ACGIH Biological Exposure Indices (BEI): 30 ug/100ml, notation B (see actual Indices for more information).

For lead, inorganic:

-NIOSH Recommended Exposure Limit (REL): 0.1 mg/m³ (TWA)

Ventilation System:

A system of local and/or general exhaust is recommended to keep employee exposures below the Airborne Exposure Limits. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area. Please refer to the ACGIH document, *Industrial Ventilation, A Manual of Recommended Practices*, most recent edition, for details.

Personal Respirators (NIOSH Approved):

If the exposure limit is exceeded, a half-face high efficiency dust/mist respirator may be worn for up to ten times the exposure limit or the maximum use concentration specified by the appropriate regulatory agency or respirator supplier, whichever is lowest. A full-face piece high efficiency dust/mist respirator may be worn up to 50 times the exposure limit, or the maximum use concentration specified by the appropriate regulatory agency or respirator supplier, whichever is lowest. For emergencies or instances where the exposure levels are not known, use a full-facepiece positive-pressure, air-supplied respirator. **WARNING:** Air-purifying respirators do not protect workers in oxygen-deficient atmospheres.

Skin Protection:

Wear impervious protective clothing, including boots, gloves, lab coat, apron or coveralls, as appropriate, to prevent skin contact.

Eye Protection:

Use chemical safety goggles and/or full face shield where dusting or splashing of solutions is possible. Maintain eye wash fountain and quick-drench facilities in work area.

Other Control Measures:

Eating, drinking, and smoking should not be permitted in areas where solids or liquids containing lead compounds are handled, processed, or stored. See OSHA substance-specific standard for more information on personal protective equipment, engineering and work practice controls, medical surveillance, record keeping, and reporting requirements. (29 CFR 1910.1025).

9. Physical and Chemical Properties

Appearance:

Small, white to blue-gray metallic shot or granules.

Odor:

Odorless.

Solubility:

Insoluble in water.

Density:

11.34

pH:

No information found.

% Volatiles by volume @ 21C (70F):

0

Boiling Point:

1740C (3164F)

Melting Point:

327.5C (622F)

Vapor Density (Air=1):

No information found.

Vapor Pressure (mm Hg):

1.77 @ 1000C (1832F)

Evaporation Rate (BuAc=1):

No information found.

10. Stability and Reactivity

Stability:

Stable under ordinary conditions of use and storage.

Hazardous Decomposition Products:

Does not decompose but toxic lead or lead oxide fumes may form at elevated temperatures.

Hazardous Polymerization:

Will not occur.

Incompatibilities:

Ammonium nitrate, chlorine trifluoride, hydrogen peroxide, sodium azide, zirconium, disodium acetylide, sodium acetylide and oxidants.

Conditions to Avoid:

Heat, flames, ignition sources and incompatibles.

11. Toxicological Information

Toxicological Data:

Investigated as a tumorigen, mutagen, reproductive effector.

Reproductive Toxicity:

Lead and other smelter emissions are human reproductive hazards. (Chemical Council on

Environmental Quality; Chemical Hazards to Human Reproduction, 1981).

Carcinogenicity:

EPA / IRIS classification: Group B2 - Probable human carcinogen, sufficient animal evidence.

-----\Cancer Lists\-----			
Ingredient	---NTP Carcinogen---		IARC Category
	Known	Anticipated	
Lead (7439-92-1)	No	No	2B

12. Ecological Information

Environmental Fate:

When released into the soil, this material is not expected to leach into groundwater. This material may bioaccumulate to some extent.

Environmental Toxicity:

No information found.

13. Disposal Considerations

Whatever cannot be saved for recovery or recycling should be managed in an appropriate and approved waste facility. Although not a listed RCRA hazardous waste, this material may exhibit one or more characteristics of a hazardous waste and require appropriate analysis to determine specific disposal requirements. Processing, use or contamination of this product may change the waste management options. State and local disposal regulations may differ from federal disposal regulations. Dispose of container and unused contents in accordance with federal, state and local requirements.

14. Transport Information

Not regulated.

15. Regulatory Information

-----\Chemical Inventory Status - Part 1\-----				
Ingredient	TSCA	EC	Japan	Australia
Lead (7439-92-1)	Yes	Yes	Yes	Yes

-----\Chemical Inventory Status - Part 2\-----				
Ingredient	Korea	--Canada--		Phil.
		DSL	NDSL	
Lead (7439-92-1)	Yes	Yes	No	Yes


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-----\Federal, State & International Regulations - Part 1\-----
-SARA 302-      -----SARA 313-----
Ingredient      RQ      TPQ      List  Chemical Catg.
-----
Lead (7439-92-1)      No      No      Yes      No

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-----\Federal, State & International Regulations - Part 2\-----
-RCRA-      -TSCA-
Ingredient      CERCLA      261.33      8(d)
-----
Lead (7439-92-1)      10      No      No

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Chemical Weapons Convention: No TSCA 12(b): No CDTA: No
 SARA 311/312: Acute: Yes Chronic: Yes Fire: No Pressure: No
 Reactivity: No (Pure / Solid)

WARNING:

THIS PRODUCT CONTAINS CHEMICALS KNOWN TO THE STATE OF CALIFORNIA TO CAUSE CANCER AND BIRTH DEFECTS OR OTHER REPRODUCTIVE HARM.

Australian Hazchem Code: No information found.

Poison Schedule: S6

WHMIS:

This MSDS has been prepared according to the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR.

16. Other Information

NFPA Ratings: Health: 3 Flammability: 1 Reactivity: 0

Label Hazard Warning:

POISON! DANGER! MAY BE FATAL IF SWALLOWED OR INHALED. CAUSES IRRITATION TO SKIN, EYES AND RESPIRATORY TRACT. NEUROTOXIN. AFFECTS THE GUM TISSUE, CENTRAL NERVOUS SYSTEM, KIDNEYS, BLOOD AND REPRODUCTIVE SYSTEM. POSSIBLE CANCER HAZARD. MAY CAUSE CANCER BASED ON ANIMAL DATA. Risk of cancer depends on duration and level of exposure.

Label Precautions:

Do not get in eyes, on skin, or on clothing.
 Do not breathe dust.
 Keep container closed.
 Use only with adequate ventilation.
 Wash thoroughly after handling.

Label First Aid:

If swallowed, induce vomiting immediately as directed by medical personnel. Never give anything by mouth to an unconscious person. If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. In case of contact, immediately flush eyes or skin with plenty of water for at least 15 minutes. Remove contaminated clothing and shoes. Wash clothing before reuse. In all cases, get medical attention.

Product Use:

Laboratory Reagent.

Revision Information:

No changes.

Disclaimer:

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Prepared by: Strategic Services Division

Phone Number: (314) 539-1600 (U.S.A.)

MSDS**Material Safety Data Sheet**

From: Mallinckrodt Baker, Inc.
222 Red School Lane
Phillipsburg, NJ 08865



24 Hour Emergency Telephone: 800-851-2151
CHEMTREC: 1-800-424-9300

National Response in Canada
CANUTEC: 613-696-6666

Outside U.S. and Canada
Chemtree: 703-827-3887

NOTE: CHEMTREC, CANUTEC and National Response Center emergency numbers to be used only in the event of chemical emergencies involving a spill, leak, fire, exposure or accident involving chemicals.

All non-emergency questions should be directed to Customer Service (1-800-582-2537) for assistance.

ARSENIC TRIOXIDE

MSDS Number: A7512 --- Effective Date: 08/02/00

1. Product Identification

Synonyms: Arsenic (III) oxide; arsenic sesquioxide; arsenous trioxide, white arsenic

CAS No.: 1327-53-3

Molecular Weight: 197.84

Chemical Formula: As₂O₃

Product Codes: 0061

2. Composition/Information on Ingredients

Ingredient	CAS No	Percent	Hazardous
Arsenic Trioxide	1327-53-3	99 - 100%	Yes

3. Hazards Identification

Emergency Overview

DANGER! MAY BE FATAL IF SWALLOWED OR INHALED. CANCER HAZARD. CONTAINS INORGANIC ARSENIC WHICH CAN CAUSE CANCER. Risk of cancer depends on duration and level of exposure. CAUSES IRRITATION TO SKIN, EYES AND RESPIRATORY TRACT. MAY CAUSE LIVER AND KIDNEY DAMAGE. USE ONLY WITH ADEQUATE VENTILATION AND RESPIRATORY EQUIPMENT.

J.T. Baker SAF-T-DATA^(tm) Ratings (Provided here for your convenience)

Health Rating: 4 - Extreme (Cancer Causing)

Flammability Rating: 0 - None

Reactivity Rating: 1 - Slight

Contact Rating: 1 - Slight

Lab Protective Equip: GOGGLES; LAB COAT; VENT HOOD; PROPER GLOVES

Storage Color Code: Blue (Health)

Potential Health Effects

Inhalation:

Arsenic may cause inflammation of the mucous membranes with cough and foamy sputum, restlessness, dyspnea, cyanosis, and rales. Symptoms like those from ingestion exposure may follow. May cause pulmonary edema.

Ingestion:

Arsenic is highly toxic! May cause burning in esophagus, vomiting, and bloody diarrhea. Symptoms of cold and clammy skin, low blood pressure, weakness, headache, cramps, convulsions, and coma may follow. May cause damage to liver and kidneys. A suspected fetal toxin. Death may occur from circulatory failure. Estimated lethal dose 120 milligrams.

Skin Contact:

May cause irritation, symptoms including redness, itching, and pain.

Eye Contact:

May cause irritation with itching, burning, watering of eyes; may cause conjunctiva damage.

Chronic Exposure:

Arsenic on repeated or prolonged skin contact may cause bronzing of the skin, edema, dermatitis, and lesions. Repeated or prolonged inhalation of dust may cause damage to the nasal septum. Chronic exposure from inhalation or ingestion may cause hair and weight loss, a garlic odor to the breath and perspiration, excessive salivation and perspiration, central nervous system damage, hepatitis, gastrointestinal disturbances, cardiovascular damage, and kidney and liver damage. Arsenic compounds are known human carcinogens and may be teratogenic based on effects in laboratory animals.

Aggravation of Pre-existing Conditions:

No information found.

4. First Aid Measures

Inhalation:

Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

Ingestion:

Induce vomiting immediately as directed by medical personnel. Never give anything by

mouth to an unconscious person. Get medical attention immediately.

Skin Contact:

Immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Get medical attention immediately. Wash clothing before reuse. Thoroughly clean shoes before reuse. Contaminated work clothes should be laundered by individuals who have been informed of the hazards of exposure to this substance.

Eye Contact:

Immediately flush eyes with plenty of water for at least 15 minutes, lifting lower and upper eyelids occasionally. Get medical attention immediately.

Note to Physician:

If emesis is unsuccessful after two doses of Ipecac, consider gastric lavage. Monitor urine arsenic level. Alkalization of urine may help prevent disposition of red cell breakdown products in renal tubular cells. If acute exposure is significant, maintain high urine output and monitor volume status, preferably with central venous pressure line. Abdominal X-rays should be done routinely for all ingestions. Chelation therapy with BAL, followed by n-penicillamine is recommended, but specific dosing guidelines are not clearly established.

5. Fire Fighting Measures

Fire:

Not considered to be a fire hazard. Toxic fumes of arsenic trioxide and arsine may be formed in fire situations.

Explosion:

Not considered to be an explosion hazard.

Fire Extinguishing Media:

Use any means suitable for extinguishing surrounding fire.

Special Information:

In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode.

6. Accidental Release Measures

Ventilate area of leak or spill. Wear appropriate personal protective equipment as specified in Section 8. Spills: Sweep up and containerize for reclamation or disposal. Vacuuming or wet sweeping may be used to avoid dust dispersal. US Regulations (CERCLA) require reporting spills and releases to soil, water and air in excess of reportable quantities. The toll free number for the US Coast Guard National Response Center is (800) 424-8802.

7. Handling and Storage

Keep in a tightly closed container, stored in a cool, dry, ventilated area. Protect against physical damage. Isolate from incompatible substances. Wear special protective equipment (Sec. 8) for maintenance break-in or where exposures may exceed established exposure levels. Wash hands, face, forearms and neck when exiting restricted areas. Shower, dispose of outer clothing, change to clean garments at the end of the day. Avoid cross-contamination of street clothes. Wash hands before eating and do not eat, drink, or smoke in workplace. Containers of this material may be hazardous when empty since they retain product residues (dust, solids); observe all warnings and precautions listed for the product.

8. Exposure Controls/Personal Protection

Airborne Exposure Limits:

-OSHA Permissible Exposure Limit (PEL):

10 ug(As)/m3 ppm (TWA)

-ACGIH Threshold Limit Value (TLV):

0.01 mg(As)/m3 (TWA),

listed as A1, confirmed human carcinogen.

Ventilation System:

A system of local and/or general exhaust is recommended to keep employee exposures below the Airborne Exposure Limits. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area. Please refer to the ACGIH document, *Industrial Ventilation, A Manual of Recommended Practices*, most recent edition, for details.

Personal Respirators (NIOSH Approved):

If the exposure limit is exceeded, a half-face high efficiency dust/mist respirator may be worn for up to ten times the exposure limit or the maximum use concentration specified by the appropriate regulatory agency or respirator supplier, whichever is lowest. A full-face piece high efficiency dust/mist respirator may be worn up to 50 times the exposure limit, or the maximum use concentration specified by the appropriate regulatory agency or respirator supplier, whichever is lowest. For emergencies or instances where the exposure levels are not known, use a full-facepiece positive-pressure, air-supplied respirator. **WARNING:** Air-purifying respirators do not protect workers in oxygen-deficient atmospheres.

Skin Protection:

Wear impervious protective clothing, including boots, gloves, lab coat, apron or coveralls, as appropriate, to prevent skin contact.

Eye Protection:

Use chemical safety goggles and/or full face shield where dusting or splashing of solutions is possible. Maintain eye wash fountain and quick-drench facilities in work area.

Other Control Measures:

Any area where inorganic arsenic is stored, handled, used, etc., must be established as a 'Regulated Area' with controlled access, limited to authorized persons. Containers of inorganic arsenic and Regulated Areas must be labeled to show a **CANCER SUSPECT**

AGENT is present. Eating, drinking, and smoking should not be permitted in areas where solids or liquids containing arsenic or lead compounds are handled, processed, or stored. See OSHA substance-specific standard for more information on personal protective equipment, engineering and work practice controls, medical surveillance, record keeping, and reporting requirements. (arsenic: 29 CFR 1910.1018; lead: 29 CFR 1910.1025).

9. Physical and Chemical Properties

Appearance:

Transparent crystals, or white powder.

Odor:

Odorless.

Solubility:

3.7 g/100 ml water @ 20C (68F)

Specific Gravity:

3.74

pH:

No information found.

% Volatiles by volume @ 21C (70F):

0

Boiling Point:

465C (869F)

Melting Point:

315C (599F)

Vapor Density (Air=1):

No information found.

Vapor Pressure (mm Hg):

No information found.

Evaporation Rate (BuAc=1):

No information found.

10. Stability and Reactivity

Stability:

Stable under ordinary conditions of use and storage.

Hazardous Decomposition Products:

Emits toxic fumes of arsenic when heated to decomposition.

Hazardous Polymerization:

Will not occur.

Incompatibilities:

Oxidizers, tannic acid, infusion cinchona and other vegetable astringent infusions and decoctions, iron solutions, rubidium carbide, chlorine trifluoride, fluorine, hydrogen fluoride, oxygen difluoride, acids, bases, sodium chlorate, zinc filings, other reactive metals and mercury. Corrosive to metals in the presence of moisture.

Conditions to Avoid:

Incompatibles.

11. Toxicological Information

Toxicological Data:

Oral rat LD50: 14.6 mg/kg; investigated as a mutagen, tumorigen, reproductive effector.

Reproductive Toxicity:

Has shown teratogenic effects in laboratory animals.

-----\Cancer Lists\-----			
Ingredient	---NTP Carcinogen---		IARC Category
	Known	Anticipated	
Arsenic Trioxide (1327-53-3)	Yes	No	1

12. Ecological Information

Environmental Fate:

When released into the soil, this material may biodegrade to a moderate extent. When released into water, this material may biodegrade to a moderate extent. This material is not expected to significantly bioaccumulate.

Environmental Toxicity:

No information found.

13. Disposal Considerations

Whatever cannot be saved for recovery or recycling should be handled as hazardous waste and sent to a RCRA approved waste facility. Processing, use or contamination of this product may change the waste management options. State and local disposal regulations may differ from federal disposal regulations. Dispose of container and unused contents in accordance with federal, state and local requirements.

14. Transport Information

Domestic (Land, D.O.T.)

Proper Shipping Name: RQ, ARSENIC TRIOXIDE

Hazard Class: 6.1

UN/NA: UN1561

Packing Group: II

Information reported for product/size: 500G

International (Water, I.M.O.)

Proper Shipping Name: ARSENIC TRIOXIDE

Hazard Class: 6.1

UN/NA: UN1561

Packing Group: II

Information reported for product/size: 500G

International (Air, I.C.A.O.)

Proper Shipping Name: ARSENIC TRIOXIDE

Hazard Class: 6.1

UN/NA: UN1561

Packing Group: II

Information reported for product/size: 500G

15. Regulatory Information

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-----\Chemical Inventory Status - Part 1\-----
Ingredient                                     TSCA   EC    Japan  Australia
-----
Arsenic Trioxide (1327-53-3)                 Yes   Yes   Yes    Yes
  
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-----\Chemical Inventory Status - Part 2\-----
Ingredient                                     Korea  --Canada--  DSL  NDSL  Phil.
-----
Arsenic Trioxide (1327-53-3)                 Yes   Yes         No    Yes
  
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-----\Federal, State & International Regulations - Part 1\-----
Ingredient                                     -SARA 302-   -SARA 313-
RQ    TPQ    List  Chemical Catg.
-----
Arsenic Trioxide (1327-53-3)                 1    100*    No    Arsenic comp
  
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-----\Federal, State & International Regulations - Part 2\-----
Ingredient                                     -RCRA-      -TSCA-
CERCLA  261.33  8(d)
-----
Arsenic Trioxide (1327-53-3)                 1          P012      No
  
```

Chemical Weapons Convention: No TSCA 12(b): No CDTA: No
 SARA 311/312: Acute: Yes Chronic: Yes Fire: No Pressure: No
 Reactivity: No (Pure / Solid)

WARNING:

THIS PRODUCT CONTAINS CHEMICALS KNOWN TO THE STATE OF CALIFORNIA TO CAUSE CANCER AND BIRTH DEFECTS OR OTHER REPRODUCTIVE HARM.

Australian Hazchem Code: 2Z

Poison Schedule: S6

WHMIS:

This MSDS has been prepared according to the hazard criteria of the Controlled Products

Regulations (CPR) and the MSDS contains all of the information required by the CPR.

16. Other Information

NFPA Ratings: Health: 3 Flammability: 0 Reactivity: 0

Label Hazard Warning:

DANGER! MAY BE FATAL IF SWALLOWED OR INHALED. CANCER HAZARD. CONTAINS INORGANIC ARSENIC WHICH CAN CAUSE CANCER. Risk of cancer depends on duration and level of exposure. CAUSES IRRITATION TO SKIN, EYES AND RESPIRATORY TRACT. MAY CAUSE LIVER AND KIDNEY DAMAGE. USE ONLY WITH ADEQUATE VENTILATION AND RESPIRATORY EQUIPMENT.

Label Precautions:

Do not get in eyes, on skin, or on clothing.

Do not breathe dust.

Keep container closed.

Use only with adequate ventilation.

Wash thoroughly after handling.

Label First Aid:

If swallowed, induce vomiting immediately as directed by medical personnel. Never give anything by mouth to an unconscious person. Get medical attention immediately. If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. In case of contact, immediately flush eyes or skin with plenty of water for at least 15 minutes. Remove contaminated clothing and shoes. Wash clothing before reuse. In all cases, get medical attention.

Product Use:

Laboratory Reagent.

Revision Information:

No changes.

Disclaimer:

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Prepared by: Strategic Services Division
Phone Number: (314) 539-1600 (U.S.A.)

**** SECTION 1 - CHEMICAL PRODUCT AND COMPANY IDENTIFICATION ****

MSDS Name: Benzo(a)pyrene, 98%

Catalog Numbers:

AC105600000, AC105600010, AC105601000

Synonyms:

3,4-Benzopyrene; 3,4-Benzpyrene.

Company Identification (Europe): Acros Organics BVBA

Janssen Pharmaceutica
2440 Geel, Belgium

Company Identification (USA): Acros Organics

One Reagent Lane
Fairlawn, NJ 07410

For information in North America, call: 800-ACROS-01

For information in Europe, call: 0032(0) 14575211

For emergencies in the US, call CHEMTREC: 800-424-9300

For emergencies in Europe, call: 0032(0) 14575299

**** SECTION 2 - COMPOSITION, INFORMATION ON INGREDIENTS ****

CAS#	Chemical Name	%	EINECS#
50-32-8	Benzo[a]pyrene	98.0	200-028-5

Hazard Symbols: T

Risk Phrases: 45 46 60 61

**** SECTION 3 - HAZARDS IDENTIFICATION ****

EMERGENCY OVERVIEW

May cause cancer. May cause heritable genetic damage. May impair fertility. May cause harm to the unborn child. Cancer suspect agent. The toxicological properties of this material have not been fully investigated.

Potential Health Effects

Eye:

May cause eye irritation.

Skin:

May cause skin irritation.

Ingestion:

May cause irritation of the digestive tract. The toxicological properties of this substance have not been fully investigated.

Inhalation:

May cause respiratory tract irritation. The toxicological properties of this substance have not been fully investigated.

Chronic:

May cause cancer in humans.

**** SECTION 4 - FIRST AID MEASURES ****

Eyes:

Flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Immediately flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Get medical aid.

Skin:

Get medical aid. Flush skin with plenty of soap and water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse.

Ingestion:

Never give anything by mouth to an unconscious person. Get medical aid. Do NOT induce vomiting. If conscious and alert, rinse mouth and drink 2-4 cupfuls of milk or water.

Inhalation:

Remove from exposure to fresh air immediately. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical aid.

Notes to Physician:

**** SECTION 5 - FIRE FIGHTING MEASURES ****

General Information:

As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. During a fire, irritating and highly toxic gases may be generated by thermal decomposition or combustion.

Extinguishing Media:

In case of fire, use water, dry chemical, chemical foam, or alcohol-resistant foam. Use agent most appropriate to extinguish fire. Use water spray, dry chemical, carbon dioxide, or appropriate foam.

**** SECTION 6 - ACCIDENTAL RELEASE MEASURES ****

General Information: Use proper personal protective equipment as indicated in Section 8.

Spills/Leaks:

Clean up spills immediately, observing precautions in the Protective Equipment section. Sweep up, then place into a suitable container for disposal. Avoid generating dusty conditions. Provide ventilation.

**** SECTION 7 - HANDLING and STORAGE ****

Handling:

Wash thoroughly after handling. Use with adequate ventilation. Minimize dust generation and accumulation. Avoid contact with eyes, skin, and clothing. Keep container tightly closed. Avoid ingestion and inhalation.

Storage:

Store in a tightly closed container. Store in a cool, dry, well-ventilated area away from incompatible substances.

**** SECTION 8 - EXPOSURE CONTROLS, PERSONAL PROTECTION ****

Engineering Controls:

Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower. Use adequate ventilation to keep airborne concentrations low. Use adequate general or local exhaust ventilation to keep airborne concentrations below the permissible exposure limits.

Personal Protective Equipment

Eyes:

Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.

Skin:

Wear appropriate protective gloves to prevent skin exposure.

Clothing:

Wear appropriate protective clothing to prevent skin exposure.

Respirators:

A respiratory protection program that meets OSHA's 29 CFR :1910.134 and ANSI Z88.2 requirements or European Standard EN 149 must be followed whenever workplace conditions warrant a respirator's use. Wear a NIOSH/MSHA or European Standard EN 149 approved full-facepiece airline respirator in the positive pressure mode with emergency escape provisions.

**** SECTION 9 - PHYSICAL AND CHEMICAL PROPERTIES ****

Physical State: Solid
Appearance: slightly brown
Odor: faint aromatic odor

pH: Not available.
Vapor Pressure: Not available.
Vapor Density: Not available.
Evaporation Rate: Not available.
Viscosity: Not available.
Boiling Point: 495 deg C @ 760.00mm Hg
Freezing/Melting Point: 175 - 177 deg C
Autoignition Temperature: Not available.
Flash Point: Not available.
Explosion Limits, lower: Not available.
Explosion Limits, upper: Not available.
Decomposition Temperature:
Solubility: 1.60x10⁻³ mg/l @25&C
Specific Gravity/Density:
Molecular Formula: C20H12
Molecular Weight: 252.31

**** SECTION 10 - STABILITY AND REACTIVITY ****

Chemical Stability:
Stable under normal temperatures and pressures.
Conditions to Avoid:
Incompatible materials, dust generation.
Incompatibilities with Other Materials:
Strong oxidizing agents.
Hazardous Decomposition Products:
Carbon monoxide, irritating and toxic fumes and gases, carbon dioxide, acrid smoke and fumes.
Hazardous Polymerization: Has not been reported.

**** SECTION 11 - TOXICOLOGICAL INFORMATION ****

RTECS#:
CAS# 50-32-8: DJ3675000
LD50/LC50:
Not available.
Carcinogenicity:
Benzo[a]pyrene -
ACGIH: A2 - suspected human carcinogen
California: carcinogen; initial date 7/1/87
NIOSH: occupational carcinogen (listed as ** undefined **)
NTP: Suspect carcinogen
OSHA: Possible Select carcinogen
IARC: Group 2A carcinogen
Epidemiology:
No information available.
Teratogenicity:
No information available.
Reproductive Effects:
No information available.
Neurotoxicity:
No information available.
Mutagenicity:
No information available.
Other Studies:
No data available.

**** SECTION 12 - ECOLOGICAL INFORMATION ****

Other
No information available.

**** SECTION 13 - DISPOSAL CONSIDERATIONS ****

Dispose of in a manner consistent with federal, state, and local regulations.

**** SECTION 14 - TRANSPORT INFORMATION ****

US DOT
Shipping Name: TOXIC SOLID, ORGANIC, N.O.S.*

Hazard Class: 6.1
UN Number: 2811
Packing Group: I
Canadian TDG
No information available.

**** SECTION 15 - REGULATORY INFORMATION ****

US FEDERAL

TSCA

CAS# 50-32-8 is listed on the TSCA inventory.
This material does not contain any Class 2 Ozone depleters.

Clean Water Act:

None of the chemicals in this product are listed as Hazardous Substances under the CWA.
CAS# 50-32-8 is listed as a Priority Pollutant under the Clean Water Act.
None of the chemicals in this product are listed as Toxic Pollutants under the CWA.

OSHA:

None of the chemicals in this product are considered highly hazardous by OSHA.

STATE

Benzo[a]pyrene can be found on the following state right to know lists: California, New Jersey, Florida, Pennsylvania, Minnesota, Massachusetts.

The following statement(s) is(are) made in order to comply with the California Safe Drinking Water Act:

WARNING: This product contains Benzo[a]pyrene, a chemical known to the state of California to cause cancer.

California No Significant Risk Level:

CAS# 50-32-8: no significant risk level = 0.06 ug/day

European/International Regulations

European Labeling in Accordance with EC Directives

Hazard Symbols: T

Risk Phrases:

- R 45 May cause cancer.
- R 46 May cause heritable genetic damage.
- R 60 May impair fertility.
- R 61 May cause harm to the unborn child.

Safety Phrases:

- S 53 Avoid exposure - obtain special instructions before use.
- S 28A After contact with skin, wash immediately with plenty of water.
- S 37 Wear suitable gloves.
- S 45 In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).

WGK (Water Danger/Protection)

CAS# 50-32-8: No information available.

United Kingdom Occupational Exposure Limits

Canada

CAS# 50-32-8 is listed on Canada's DSL List.

CAS# 50-32-8 is listed on Canada's Ingredient Disclosure List.

Exposure Limits

CAS# 50-32-8: OEL-AUSTRALIA;Carcinogen

OEL-BELGIUM;Carcinogen

OEL-FINLAND:TWA 0.01 mg/m3;Skin;Carcinogen

OEL-FRANCE;Carcinogen

OEL-GERMANY;Carcinogen

OEL-RUSSIA:STEL 0.00015 mg/m3;Carcinogen

OEL-SWEDEN:TWA 0.005 mg/m3;STEL 0.03 mg/m3;Skin

OEL IN BULGARIA, COLOMBIA, JORDAN, KOREA check ACGIH TLV

OEL IN NEW ZEALAND, SINGAPORE, VIETNAM check ACGI TLV

**** SECTION 16 - ADDITIONAL INFORMATION ****

MSDS Creation Date: 9/02/1997 Revision #4 Date: 8/02/2000

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no way shall the company be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever arising, even if the company has been advised of the possibility of such damages.

International Chemical Safety Cards

BENZ(a)ANTHRACENE

ICSC: 0385

<p style="text-align: center;"> BENZ(a)ANTHRACENE 1,2-Benzoanthracene Benzo(a)anthracene 2,3-Benzphenanthrene Naphthanthrane $C_{18}H_{12}$ Molecular mass: 228.3 </p> <p> CAS # 56-55-3 RTECS # CV9275000 ICSC # 0385 EC # 601-033-00-9 </p>			
TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE	Combustible.		Water spray, powder. In case of fire in the surroundings: all extinguishing agents allowed.
EXPLOSION	Finely dispersed particles form explosive mixtures in air.	Prevent deposition of dust; closed system, dust explosion-proof electrical equipment and lighting.	
EXPOSURE		AVOID ALL CONTACT!	
• INHALATION		Local exhaust or breathing protection.	Fresh air, rest.
• SKIN		Protective gloves. Protective clothing.	Remove contaminated clothes. Rinse and then wash skin with water and soap.
• EYES		Safety goggles, face shield, or eye protection in combination with breathing protection.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
• INGESTION		Do not eat, drink, or smoke during work. Wash hands before eating.	Rinse mouth.
SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING	
Sweep spilled substance into sealable containers; if appropriate, moisten first to prevent dusting. Carefully collect remainder, then remove to safe place (extra personal protection: complete protective clothing including self-contained breathing apparatus).	Well closed.	T symbol R: 45 S: 53-45	

SEE IMPORTANT INFORMATION ON BACK

ICSC: 0385

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities © IPCS CEC 1993

International Chemical Safety Cards

BENZ(a)ANTHRACENE

ICSC: 0385

I M P O R T A N T D A T A	PHYSICAL STATE; APPEARANCE: COLOURLESS TO YELLOW-BROWN FLUORESCENT FLAKES OR POWDER.	ROUTES OF EXPOSURE: The substance can be absorbed into the body by inhalation, through the skin and by ingestion.
	PHYSICAL DANGERS: Dust explosion possible if in powder or granular form, mixed with air.	INHALATION RISK: Evaporation at 20°C is negligible; a harmful concentration of airborne particles can, however, be reached quickly.
	CHEMICAL DANGERS:	EFFECTS OF SHORT-TERM EXPOSURE:
	OCCUPATIONAL EXPOSURE LIMITS (OELs): TLV not established.	EFFECTS OF LONG-TERM OR REPEATED EXPOSURE: This substance is probably carcinogenic to humans.
PHYSICAL PROPERTIES	Sublimation point: 435°C Melting point: 162°C Relative density (water = 1): 1.274	Solubility in water: none Vapour pressure, Pa at 20°C: 292 Octanol/water partition coefficient as log Pow: 5.61
ENVIRONMENTAL DATA	In the food chain important to humans, bioaccumulation takes place, specifically in seafood.	
NOTES		
This substance is one of many polycyclic aromatic hydrocarbons - standards are usually established for them as mixtures, e.g., coal tar pitch volatiles. However, it may be encountered as a laboratory chemical in its pure form. Insufficient data are available on the effect of this substance on human health, therefore utmost care must be taken. Do NOT take working clothes home. Tetraphene is a common name.		
ADDITIONAL INFORMATION		
ICSC: 0385		BENZ(a)ANTHRACENE
© IPCS, CEC, 1993		

IMPORTANT LEGAL NOTICE:	Neither the CEC or the IPCS nor any person acting on behalf of the CEC or the IPCS is responsible for the use which might be made of this information. This card contains the collective views of the IPCS Peer Review Committee and may not reflect in all cases all the detailed requirements included in national legislation on the subject. The user should verify compliance of the cards with the relevant legislation in the country of use.
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MSDS**Material Safety Data Sheet**

From: Mallinckrodt Baker, Inc.
222 Red School Lane
Phillipsburg, NJ 08865



Mallinckrodt
CHEMICALS



24 Hour Emergency Telephone: 908-969-2151
CHEMTREC: 1-800-424-9300

National Response in Canada
CANUTEC: 613-466-6666

Outside U.S. and Canada
Chemtrec: 703-527-3887

NOTE: CHEMTREC, CANUTEC and National Response Center emergency numbers to be used only in the event of chemical emergencies involving a spill, leak, fire, exposure or accident involving chemicals.

All non-emergency questions should be directed to Customer Service (1-800-582-2537) for assistance.

ACETONE

MSDS Number: A0446 --- *Effective Date: 04/10/01*

1. Product Identification

Synonyms: Dimethylketone; 2-propanone; dimethylketal

CAS No.: 67-64-1

Molecular Weight: 58.08

Chemical Formula: (CH₃)₂CO

Product Codes:

J.T. Baker: 5356, 5580, 5805, 9001, 9002, 9003, 9004, 9005, 9006, 9007, 9008, 9009, 9010, 9015, 9036, 9125, 9254, 9271, A134, V655

Mallinckrodt: 0018, 2432, 2435, 2437, 2438, 2440, 2443, 2445, 2850, H451, H580, H981

2. Composition/Information on Ingredients

Ingredient	CAS No	Percent	Hazardous
Acetone	67-64-1	99 - 100%	Yes

3. Hazards Identification

Emergency Overview

DANGER! EXTREMELY FLAMMABLE LIQUID AND VAPOR. VAPOR MAY CAUSE FLASH FIRE. HARMFUL IF SWALLOWED OR INHALED. CAUSES

IRRITATION TO SKIN, EYES AND RESPIRATORY TRACT. AFFECTS CENTRAL NERVOUS SYSTEM.

J.T. Baker SAF-T-DATA^(tm) Ratings (Provided here for your convenience)

Health Rating: 1 - Slight

Flammability Rating: 4 - Extreme (Flammable)

Reactivity Rating: 2 - Moderate

Contact Rating: 1 - Slight

Lab Protective Equip: GOGGLES; LAB COAT; VENT HOOD; PROPER GLOVES;
CLASS B EXTINGUISHER

Storage Color Code: Red (Flammable)

Potential Health Effects

Inhalation:

Inhalation of vapors irritates the respiratory tract. May cause coughing, dizziness, dullness, and headache. Higher concentrations can produce central nervous system depression, narcosis, and unconsciousness.

Ingestion:

Swallowing small amounts is not likely to produce harmful effects. Ingestion of larger amounts may produce abdominal pain, nausea and vomiting. Aspiration into lungs can produce severe lung damage and is a medical emergency. Other symptoms are expected to parallel inhalation.

Skin Contact:

Irritating due to defatting action on skin. Causes redness, pain, drying and cracking of the skin.

Eye Contact:

Vapors are irritating to the eyes. Splashes may cause severe irritation, with stinging, tearing, redness and pain.

Chronic Exposure:

Prolonged or repeated skin contact may produce severe irritation or dermatitis.

Aggravation of Pre-existing Conditions:

Use of alcoholic beverages enhances toxic effects. Exposure may increase the toxic potential of chlorinated hydrocarbons, such as chloroform, trichloroethane.

4. First Aid Measures

Inhalation:

Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

Ingestion:

Aspiration hazard. If swallowed, vomiting may occur spontaneously, but DO NOT INDUCE. If vomiting occurs, keep head below hips to prevent aspiration into lungs. Never give anything by mouth to an unconscious person. Call a physician immediately.

Skin Contact:

Immediately flush skin with plenty of water for at least 15 minutes. Remove contaminated clothing and shoes. Get medical attention. Wash clothing before reuse. Thoroughly clean shoes before reuse.

Eye Contact:

Immediately flush eyes with plenty of water for at least 15 minutes, lifting upper and lower eyelids occasionally. Get medical attention.

5. Fire Fighting Measures

Fire:

Flash point: -20C (-4F) CC

Autoignition temperature: 465C (869F)

Flammable limits in air % by volume:

lcl: 2.5; ucl: 12.8

Extremely Flammable Liquid and Vapor! Vapor may cause flash fire.

Explosion:

Above flash point, vapor-air mixtures are explosive within flammable limits noted above. Vapors can flow along surfaces to distant ignition source and flash back. Contact with strong oxidizers may cause fire. Sealed containers may rupture when heated. This material may produce a floating fire hazard. Sensitive to static discharge.

Fire Extinguishing Media:

Dry chemical, alcohol foam or carbon dioxide. Water may be ineffective. Water spray may be used to keep fire exposed containers cool, dilute spills to nonflammable mixtures, protect personnel attempting to stop leak and disperse vapors.

Special Information:

In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode.

6. Accidental Release Measures

Ventilate area of leak or spill. Remove all sources of ignition. Wear appropriate personal protective equipment as specified in Section 8. Isolate hazard area. Keep unnecessary and unprotected personnel from entering. Contain and recover liquid when possible. Use non-sparking tools and equipment. Collect liquid in an appropriate container or absorb with an inert material (e. g., vermiculite, dry sand, earth), and place in a chemical waste container. Do not use combustible materials, such as saw dust. Do not flush to sewer! If a leak or spill has not ignited, use water spray to disperse the vapors, to protect personnel attempting to stop leak, and to flush spills away from exposures. US Regulations (CERCLA) require reporting spills and releases to soil, water and air in excess of reportable quantities. The toll free number for the US Coast Guard National Response Center is (800) 424-8802.

J. T. Baker SOLUSORB(R) solvent adsorbent is recommended for spills of this product.

7. Handling and Storage

Protect against physical damage. Store in a cool, dry well-ventilated location, away from any area where the fire hazard may be acute. Outside or detached storage is preferred. Separate from incompatibles. Containers should be bonded and grounded for transfers to avoid static sparks. Storage and use areas should be No Smoking areas. Use non-sparking type tools and equipment, including explosion proof ventilation. Containers of this material may be hazardous when empty since they retain product residues (vapors, liquid); observe all warnings and precautions listed for the product.

8. Exposure Controls/Personal Protection

Airborne Exposure Limits:

Acetone:

-OSHA Permissible Exposure Limit (PEL):

1000 ppm (TWA)

-ACGIH Threshold Limit Value (TLV):

500 ppm (TWA), 750 ppm (STEL) A4 - not classifiable as a human carcinogen

Ventilation System:

A system of local and/or general exhaust is recommended to keep employee exposures below the Airborne Exposure Limits. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area. Please refer to the ACGIH document, *Industrial Ventilation, A Manual of Recommended Practices*, most recent edition, for details.

Personal Respirators (NIOSH Approved):

If the exposure limit is exceeded, a half-face organic vapor respirator may be worn for up to ten times the exposure limit or the maximum use concentration specified by the appropriate regulatory agency or respirator supplier, whichever is lowest. A full-face piece organic vapor respirator may be worn up to 50 times the exposure limit or the maximum use concentration specified by the appropriate regulatory agency or respirator supplier, whichever is lowest. For emergencies or instances where the exposure levels are not known, use a full-face piece positive-pressure, air-supplied respirator.

WARNING: Air-purifying respirators do not protect workers in oxygen-deficient atmospheres.

Skin Protection:

Wear impervious protective clothing, including boots, gloves, lab coat, apron or coveralls, as appropriate, to prevent skin contact.

Eye Protection:

Use chemical safety goggles and/or a full face shield where splashing is possible. Maintain eye wash fountain and quick-drench facilities in work area.

9. Physical and Chemical Properties

Appearance:

Clear, colorless, volatile liquid.

Odor:

Fragrant, mint-like

Solubility:

Miscible in all proportions in water.

Specific Gravity:

0.79 @ 20C/4C

pH:

No information found.

% Volatiles by volume @ 21C (70F):

100

Boiling Point:

56.5C (133F) @ 760 mm Hg

Melting Point:

-95C (-139F)

Vapor Density (Air=1):

2.0

Vapor Pressure (mm Hg):

400 @ 39.5C (104F)

Evaporation Rate (BuAc=1):

ca. 7.7

10. Stability and Reactivity

Stability:

Stable under ordinary conditions of use and storage.

Hazardous Decomposition Products:

Carbon dioxide and carbon monoxide may form when heated to decomposition.

Hazardous Polymerization:

Will not occur.

Incompatibilities:

Concentrated nitric and sulfuric acid mixtures, oxidizing materials, chloroform, alkalis, chlorine compounds, acids, potassium t-butoxide.

Conditions to Avoid:

Heat, flames, ignition sources and incompatibles.

11. Toxicological Information

Oral rat LD50: 5800 mg/kg; Inhalation rat LC50: 50,100mg/m3; Irritation eye rabbit, Standard Draize, 20 mg severe; investigated as a tumorigen, mutagen, reproductive

effector.

-----\Cancer Lists\-----			
Ingredient	---NTP Carcinogen---		IARC Category
	Known	Anticipated	

Acetone (67-64-1)	No	No	None

12. Ecological Information

Environmental Fate:

When released into the soil, this material is expected to readily biodegrade. When released into the soil, this material is expected to leach into groundwater. When released into the soil, this material is expected to quickly evaporate. When released into water, this material is expected to readily biodegrade. When released to water, this material is expected to quickly evaporate. This material has a log octanol-water partition coefficient of less than 3.0. This material is not expected to significantly bioaccumulate. When released into the air, this material may be moderately degraded by reaction with photochemically produced hydroxyl radicals. When released into the air, this material may be moderately degraded by photolysis. When released into the air, this material is expected to be readily removed from the atmosphere by wet deposition.

Environmental Toxicity:

This material is not expected to be toxic to aquatic life. The LC50/96-hour values for fish are over 100 mg/l.

13. Disposal Considerations

Whatever cannot be saved for recovery or recycling should be handled as hazardous waste and sent to a RCRA approved incinerator or disposed in a RCRA approved waste facility. Processing, use or contamination of this product may change the waste management options. State and local disposal regulations may differ from federal disposal regulations. Dispose of container and unused contents in accordance with federal, state and local requirements.

14. Transport Information

Domestic (Land, D.O.T.)

Proper Shipping Name: ACETONE

Hazard Class: 3

UN/NA: UN1090

Packing Group: II

Information reported for product/size: 350LB

International (Water, I.M.O.)

Proper Shipping Name: ACETONE
Hazard Class: 3.1
UN/NA: UN1090
Packing Group: II
Information reported for product/size: 350LB

15. Regulatory Information

-----\Chemical Inventory Status - Part 1\-----
 Ingredient TSCA EC Japan Australia

 Acetone (67-64-1) Yes Yes Yes Yes

-----\Chemical Inventory Status - Part 2\-----
 Ingredient Korea --Canada-- DSL NDSL Phil.

 Acetone (67-64-1) Yes Yes No Yes

-----\Federal, State & International Regulations - Part 1\-----
 Ingredient -SARA 302- -SARA 313-----
 RQ TPQ List Chemical Catg.

 Acetone (67-64-1) No No Yes No

-----\Federal, State & International Regulations - Part 2\-----
 Ingredient CERCLA -RCRA- -TSCA-

 Acetone (67-64-1) 5000 U002 No

Chemical Weapons Convention: No TSCA 12(b): Yes CDTA: Yes
 SARA 311/312: Acute: Yes Chronic: No Fire: Yes Pressure: No
 Reactivity: No (Pure / Liquid)

Australian Hazchem Code: 2[Y]E

Poison Schedule: No information found.

WHMIS:

This MSDS has been prepared according to the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR.

16. Other Information

NFPA Ratings: Health: 1 Flammability: 3 Reactivity: 0

Label Hazard Warning:

DANGER! EXTREMELY FLAMMABLE LIQUID AND VAPOR. VAPOR MAY CAUSE FLASH FIRE. HARMFUL IF SWALLOWED OR INHALED. CAUSES IRRITATION TO SKIN, EYES AND RESPIRATORY TRACT. AFFECTS CENTRAL

NERVOUS SYSTEM.**Label Precautions:**

Keep away from heat, sparks and flame.

Keep container closed.

Use only with adequate ventilation.

Wash thoroughly after handling.

Avoid breathing vapor.

Avoid contact with eyes, skin and clothing.

Label First Aid:

Aspiration hazard. If swallowed, vomiting may occur spontaneously, but DO NOT

INDUCE. If vomiting occurs, keep head below hips to prevent aspiration into lungs.

Never give anything by mouth to an unconscious person. Call a physician immediately. If

inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is

difficult, give oxygen. In case of contact, immediately flush eyes or skin with plenty of

water for at least 15 minutes. Remove contaminated clothing and shoes. Wash clothing

before reuse. In all cases, get medical attention.

Product Use:

Laboratory Reagent.

Revision Information:

No changes.

Disclaimer:

Mallinckrodt Baker, Inc. provides the information contained herein in good faith but makes no representation as to its comprehensiveness or accuracy. This document is intended only as a guide to the appropriate precautionary handling of the material by a properly trained person using this product. Individuals receiving the information must exercise their independent judgment in determining its appropriateness for a particular purpose. MALLINCKRODT BAKER, INC. MAKES NO REPRESENTATIONS OR WARRANTIES, EITHER EXPRESS OR IMPLIED, INCLUDING WITHOUT LIMITATION ANY WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE WITH RESPECT TO THE INFORMATION SET FORTH HEREIN OR THE PRODUCT TO WHICH THE INFORMATION REFERS. ACCORDINGLY, MALLINCKRODT BAKER, INC. WILL NOT BE RESPONSIBLE FOR DAMAGES RESULTING FROM USE OF OR RELIANCE UPON THIS INFORMATION.

Prepared by: Environmental Health & Safety

Phone Number: (314) 654-1600 (U.S.A.)

MSDS**Material Safety Data Sheet**

From: Mallinckrodt Baker, Inc.
222 Red School Lane
Phillipsburg, NJ 08865



Mallinckrodt
CHEMICALS



24 Hour Emergency Telephone: 800-859-2151
CHEMTREC: 1-800-424-9300

National Response in Canada
CANUTEC: 613-696-6666

Outside U.S. and Canada
Chembrec: 703-527-3887

NOTE: CHEMTREC, CANUTEC and National Response Center emergency numbers to be used only in the event of chemical emergencies involving a spill, leak, fire, exposure or accident involving chemicals.

All non-emergency questions should be directed to Customer Service (1-800-582-2537) for assistance.

NITRIC ACID FUMING

MSDS Number: N3662 --- *Effective Date: 11/17/99*

1. Product Identification

Synonyms: Aqua Fortis; Azotic Acid; Nitric Acid 90%; Red fuming nitric acid

CAS No.: 7697-37-2

Molecular Weight: 63

Chemical Formula: HNO₃

Product Codes:

J.T. Baker: 9624

Mallinckrodt: 2713

2. Composition/Information on Ingredients

Ingredient	CAS No	Percent	Hazardous
Nitric Acid	7697-37-2	90 - 100%	Yes

3. Hazards Identification

Emergency Overview

POISON! DANGER! STRONG OXIDIZER. CONTACT WITH OTHER MATERIAL MAY CAUSE FIRE. CORROSIVE. LIQUID AND MIST CAUSE SEVERE BURNS TO ALL BODY TISSUE. MAY BE FATAL IF SWALLOWED OR INHALED. INHALATION MAY CAUSE LUNG AND TOOTH DAMAGE.

J.T. Baker SAF-T-DATA^(tm) Ratings (Provided here for your convenience)

Health Rating: 4 - Extreme (Poison)

Flammability Rating: 0 - None

Reactivity Rating: 3 - Severe (Oxidizer)

Contact Rating: 4 - Extreme (Corrosive)

Lab Protective Equip: GOGGLES & SHIELD; LAB COAT & APRON; VENT HOOD;
PROPER GLOVES

Storage Color Code: Yellow (Reactive)

Potential Health Effects

Nitric acid is extremely hazardous; it is corrosive, reactive, an oxidizer, and a poison.

Inhalation:

Corrosive! Inhalation of vapors can cause breathing difficulties and lead to pneumonia and pulmonary edema, which may be fatal. Other symptoms may include coughing, choking, and irritation of the nose, throat, and respiratory tract. Symptoms may disappear only to return in a few hours and more severely. Onset of symptoms may be delayed for 4-30 hours.

Ingestion:

Corrosive! Swallowing nitric acid can cause immediate pain and burns of the mouth, throat, esophagus and gastrointestinal tract.

Skin Contact:

Corrosive! Can cause redness, pain, and severe skin burns. Concentrated solutions cause deep ulcers and stain skin a yellow or yellow-brown color.

Eye Contact:

Corrosive! Vapors are irritating and may cause severe damage to the eyes. Splashes may cause severe burns and permanent eye damage.

Chronic Exposure:

Long-term exposure to concentrated vapors may cause erosion of teeth and lung damage. Long-term exposures seldom occur due to the corrosive properties of the acid.

Aggravation of Pre-existing Conditions:

Persons with pre-existing skin disorders, eye disease, or cardiopulmonary diseases may be more susceptible to the effects of this substance.

4. First Aid Measures

Immediate first aid treatment reduces the health effects of this substance.

Inhalation:

Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Call a physician.

Ingestion:

DO NOT INDUCE VOMITING! Give large quantities of water or milk if available.

Never give anything by mouth to an unconscious person. Get medical attention immediately.

Skin Contact:

In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention immediately.

Eye Contact:

Immediately flush eyes with plenty of water for at least 15 minutes, lifting lower and upper eyelids occasionally. Get medical attention immediately.

5. Fire Fighting Measures

Fire:

Not combustible, but substance is a strong oxidizer and its heat of reaction with reducing agents or combustibles may cause ignition. Can react with metals to release flammable hydrogen gas.

Explosion:

Reacts explosively with combustible organic or readily oxidizable materials such as: alcohols, turpentine, charcoal, organic refuse, metal powder, hydrogen sulfide, etc. Reacts with most metals to release hydrogen gas which can form explosive mixtures with air.

Fire Extinguishing Media:

Water spray may be used to keep fire exposed containers cool. Do not get water inside container.

Special Information:

Increases the flammability of combustible, organic and readily oxidizable materials. In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode.

6. Accidental Release Measures

Ventilate area of leak or spill. Wear appropriate personal protective equipment as specified in Section 8. Isolate hazard area. Keep unnecessary and unprotected personnel from entering. Contain and recover liquid when possible. Neutralize with alkaline material (soda ash, lime), then absorb with an inert material (e. g., vermiculite, dry sand, earth), and place in a chemical waste container. Do not use combustible materials, such as saw dust. Do not flush to sewer! US Regulations (CERCLA) require reporting spills and releases to soil, water and air in excess of reportable quantities. The toll free number for the US Coast Guard National Response Center is (800) 424-8802.

7. Handling and Storage

Store in a cool, dry, ventilated storage area with acid resistant floors and good drainage.

Protect from physical damage. Keep out of direct sunlight and away from heat, water, and incompatible materials. Do not wash out container and use it for other purposes. When diluting, the acid should always be added slowly to water and in small amounts. Never use hot water and never add water to the acid. Water added to acid can cause uncontrolled boiling and splashing. Containers of this material may be hazardous when empty since they retain product residues (vapors, liquid); observe all warnings and precautions listed for the product.

8. Exposure Controls/Personal Protection

Airborne Exposure Limits:

-OSHA Permissible Exposure Limit (PEL):

2 ppm (TWA), 4 ppm (STEL)

-ACGIH Threshold Limit Value (TLV):

2 ppm (TWA); 4 ppm (STEL)

Ventilation System:

A system of local and/or general exhaust is recommended to keep employee exposures below the Airborne Exposure Limits. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area. Please refer to the ACGIH document, *Industrial Ventilation, A Manual of Recommended Practices*, most recent edition, for details.

Personal Respirators (NIOSH Approved):

If the exposure limit is exceeded, wear a supplied air, full-facepiece respirator, airlined hood, or full-facepiece self-contained breathing apparatus. Nitric acid is an oxidizer and should not come in contact with cartridges and canisters that contain oxidizable materials, such as activated charcoal. Canister-type respirators using sorbents are ineffective.

Skin Protection:

Wear impervious protective clothing, including boots, gloves, lab coat, apron or coveralls, as appropriate, to prevent skin contact.

Eye Protection:

Use chemical safety goggles and/or a full face shield where splashing is possible. Maintain eye wash fountain and quick-drench facilities in work area.

9. Physical and Chemical Properties

Appearance:

Yellow to brownish-red fuming liquid.

Odor:

Suffocating, acrid.

Solubility:

Infinitely soluble.

Density:

1.5

pH:

No information found.

% Volatiles by volume @ 21C (70F):

100 (as water and acid)

Boiling Point:

85C (185F)

Melting Point:

ca. -50C (ca. -58F)

Vapor Density (Air=1):

2-3

Vapor Pressure (mm Hg):

48 @ 20C (68F)

Evaporation Rate (BuAc=1):

No information found.

10. Stability and Reactivity

Stability:

Stable under ordinary conditions of use and storage. Containers may burst when heated.

Hazardous Decomposition Products:

When heated to decomposition, emits toxic nitrogen oxides fumes and hydrogen nitrate.

Will react with water or steam to produce heat and toxic and corrosive fumes.

Hazardous Polymerization:

Will not occur.

Incompatibilities:

A dangerously powerful oxidizing agent, fuming nitric acid is incompatible with most substances, especially strong bases, metallic powders, carbides, hydrogen sulfide, turpentine, and combustible organics.

Conditions to Avoid:

Heat, light, moisture.

11. Toxicological Information

For Nitric Acid: Oral (human) LDLo: 430 mg/kg; Inhalation, rat, LC50: 67 ppm (NO₂)/4H.; Investigated as a mutagen and reproductive effector.

-----\Cancer Lists\-----			
Ingredient	---NTP Carcinogen---		IARC Category
	Known	Anticipated	

Nitric Acid (7697-37-2)	No	No	None

12. Ecological Information

Environmental Fate:

No information found.

Environmental Toxicity:

No information found.

13. Disposal Considerations

Whatever cannot be saved for recovery or recycling should be managed in an appropriate and approved waste facility. Although not a listed RCRA hazardous waste, this material may exhibit one or more characteristics of a hazardous waste and require appropriate analysis to determine specific disposal requirements. Processing, use or contamination of this product may change the waste management options. State and local disposal regulations may differ from federal disposal regulations. Dispose of container and unused contents in accordance with federal, state and local requirements.

14. Transport Information

Domestic (Land, D.O.T.)**Proper Shipping Name:** NITRIC ACID, RED FUMING**Hazard Class:** 8, 5.1, 6.1**UN/NA:** UN2032**Packing Group:** I**Information reported for product/size:** 2.5L**International (Water, I.M.O.)****Proper Shipping Name:** NITRIC ACID, RED FUMING**Hazard Class:** 8, 5.1, 6.1**UN/NA:** UN2032**Packing Group:** I**Information reported for product/size:** 2.5L

15. Regulatory Information

-----\Chemical Inventory Status - Part 1\----- Ingredient	TSCA	EC	Japan	Australia
Nitric Acid (7697-37-2)	Yes	Yes	Yes	Yes

-----\Chemical Inventory Status - Part 2\----- Ingredient	Korea	--Canada-- DSL	NDSL	Phil.
Nitric Acid (7697-37-2)	Yes	Yes	No	Yes

-----\Federal, State & International Regulations - Part 1\-----				
	-SARA 302-		-----SARA 313-----	
Ingredient	RQ	TPQ	List	Chemical Catg.
Nitric Acid (7697-37-2)	1000	1000	Yes	No

-----\Federal, State & International Regulations - Part 2\-----			
	CERCLA	-RCRA-	-TSCA-
Ingredient		261.33	8(d)
Nitric Acid (7697-37-2)	1000	No	No

Chemical Weapons Convention: No TSCA 12(b): No CDTA: No
 SARA 311/312: Acute: Yes Chronic: Yes Fire: Yes Pressure: No
 Reactivity: Yes (Pure / Liquid)

Australian Hazchem Code: 2PE

Poison Schedule: S6

WHMIS:

This MSDS has been prepared according to the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR.

16. Other Information

NFPA Ratings: Health: 4 Flammability: 0 Reactivity: 1 Other: Oxidizer

Label Hazard Warning:

POISON! DANGER! STRONG OXIDIZER. CONTACT WITH OTHER MATERIAL MAY CAUSE FIRE. CORROSIVE. LIQUID AND MIST CAUSE SEVERE BURNS TO ALL BODY TISSUE. MAY BE FATAL IF SWALLOWED OR INHALED. INHALATION MAY CAUSE LUNG AND TOOTH DAMAGE.

Label Precautions:

Do not get in eyes, on skin, or on clothing.
 Do not breathe vapor or mist.
 Use only with adequate ventilation.
 Wash thoroughly after handling.
 Keep from contact with clothing and other combustible materials.
 Do not store near combustible materials.
 Store in a tightly closed container.
 Remove and wash contaminated clothing promptly.

Label First Aid:

In case of contact, immediately flush eyes or skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. If swallowed, DO NOT INDUCE VOMITING. Give large quantities of water. Never give anything by mouth to an unconscious person. If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. In all cases call a physician.

Product Use:

Laboratory Reagent.

Revision Information:

New 16 section MSDS format, all sections have been revised.

Disclaimer:

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Prepared by: Environmental Health & Safety
Phone Number: (314) 654-1600 (U.S.A.)

TEXACO REFINING AND MARKETING, -- 00365 TEXACO UNLEADED GASOLINE (26000 UNLEADED

=====

MSDS Safety Information

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FSC: 9130
 NIIN: 01-282-2844
 MSDS Date: 05/19/1997
 MSDS Num: CHKYV
 Product ID: 00365 TEXACO UNLEADED GASOLINE (26000 UNLEADED REG GASOLINE)
 MFN: 01
 Responsible Party
 Cage: 2R503
 Name: TEXACO REFINING AND MARKETING, INC
 Box: 7812
 City: UNIVERSAL CITY CA 91608-4427
 Info Phone Number: 800-782-7852/914-838-7204 (#4;MSDS)
 Emergency Phone Number: 914-831-3400/800-424-9300 (CHEMTREC)
 Review Ind: Y
 Published: Y

=====

Preparer Co. when other than Responsible Party Co.

=====

Cage: 2R503
 Name: TEXACO REFINING AND MARKETING INC
 Address: 1111 RUSK ST
 City: HOUSTON TX 77002-3310

=====

Contractor Summary

=====

Cage: 7B131
 Name: TEXACO INC
 Address: UNKNOWN
 Box: 509
 City: BEACON NY 12508-0509
 Phone: 914-831-3400
 Cage: 2R503
 Name: TEXACO REFINING AND MARKETING INC
 Address: 1111 RUSK ST
 City: HOUSTON TX 77002-3310
 Phone: 713-650-5206

=====

Item Description Information

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Item Name: GASOLINE, UNLEADED
 Specification Number: ASTM D439
 Type/Grade/Class: MID-GRADE UNLEADED
 Unit of Issue: DR
 Quantitative Expression: 00000000055GL
 UI Container Qty: 55 GALLON
 Type of Container: DRUM

=====

Ingredients

=====

Cas: 8006-61-9
 RTECS #: LX3300000
 Name: GASOLINE CONSISTS OF STRAING/BRANCHED PARAFFINIC
 HYDROCARBONS, OLEFINS, CYLCOPARAFFIN, AROMATICS. 95.00-99.99%.
 % Wt: SEE ING
 Other REC Limits: NONE RECOMMENDED
 OSHA PEL: 300 PPM
 ACGIH TLV: 300 PPM/500STEL; 9596

Name: OXYGENATES, MAY OR MAY NOT CONTAIN ANY COMBINATION OF THESE

OXYG:MTBE,ETBE,TAME &/OR ETOH IN RANGE OF 0-20%.

% Wt: SEE ING

Other REC Limits: NONE RECOMMENDED

OSHA PEL: NOT ESTABLISHED

ACGIH TLV: NOT ESTABLISHED

Cas: 1634-04-4

RTECS #: KN5250000

Name: METHYL TERT-BUTYL ETHER (SARA 313) (CERCLA), 10.00-19.99%.

% Wt: SEE ING

Other REC Limits: NONE RECOMMENDED

OSHA PEL: NOT ESTABLISHED

ACGIH TLV: 40 PPM, A3; 9596

EPA Rpt Qty: 1 LB

DOT Rpt Qty: 1 LB

Cas: 637-92-3

RTECS #: KN4730200

Name: ETHYL-T-BUTYL ETHER, 10.00-19.99%

% Wt: SEE ING

Other REC Limits: NONE RECOMMENDED

OSHA PEL: NOT ESTABLISHED

ACGIH TLV: NOT ESTABLISHED

Cas: 994-05-8

RTECS #: 1007422AM

Name: TERT-AMYL METHYL ETHER, 10.00-19.99%

% Wt: SEE ING

Other REC Limits: NONE RECOMMENDED

OSHA PEL: NOT ESTABLISHED

ACGIH TLV: NOT ESTABLISHED

Cas: 64-17-5

RTECS #: KQ6300000

Name: ETHYL ALCOHOL (ETHANOL), 3.00-9.99%.

% Wt: SEE ING

Other REC Limits: NONE RECOMMENDED

OSHA PEL: 1000 PPM

ACGIH TLV: 1000 PPM; 9596

Cas: 1330-20-7

RTECS #: ZE2100000

Name: XYLENES (O-,M-,P- ISOMERS) (SARA 313) (CERCLA), 3.00-9.99%.

% Wt: SEE ING

Other REC Limits: NONE RECOMMENDED

OSHA PEL: 100 PPM

ACGIH TLV: 100 PPM/150STEL;9596

EPA Rpt Qty: 1000 LBS

DOT Rpt Qty: 1000 LBS

Cas: 108-88-3

RTECS #: XS5250000

Name: TOLUENE (SARA 313) (CERCLA), 3.00-9.99%.

% Wt: SEE ING

Other REC Limits: NONE RECOMMENDED

OSHA PEL: 200 PPM; Z-2

ACGIH TLV: S, 50 PPM; 9596

EPA Rpt Qty: 1000 LBS

DOT Rpt Qty: 1000 LBS

Cas: 71-43-2

RTECS #: CY1400000

Name: BENZENE (SARA 313) (CERCLA), 1.00-2.99%.

% Wt: SEE ING

Other REC Limits: NONE RECOMMENDED
 OSHA PEL: SEE 1910.1028
 ACGIH TLV: 10 PPM; A2; 9596
 EPA Rpt Qty: 10 LBS
 DOT Rpt Qty: 10 LBS

 Cas: 95-63-6
 RTECS #: DC3325000
 Name: 1,2,4-TRIMETHYLBENZENE (SARA 313), 1.00-2.99%.
 % Wt: SEE ING
 Other REC Limits: NONE RECOMMENDED
 OSHA PEL: 25 PPM
 ACGIH TLV: 25 PPM; 9596

 Cas: 110-54-3
 RTECS #: MN9275000
 Name: HEXANE (N-HEXANE) (CERCLA), 1.00-2.99%.
 % Wt: SEE ING
 Other REC Limits: NONE RECOMMENDED
 OSHA PEL: 500 PPM
 ACGIH TLV: 50 PPM; 9596
 EPA Rpt Qty: 1 LB
 DOT Rpt Qty: 1 LB

 Cas: 100-41-4
 RTECS #: DA0700000
 Name: ETHYL BENZENE (SARA 313), 1.00-2.99%.
 % Wt: SEE ING
 Other REC Limits: NONE RECOMMENDED
 OSHA PEL: 100 PPM
 ACGIH TLV: 100 PPM/125STEL;9596
 EPA Rpt Qty: 1000 LBS
 DOT Rpt Qty: 1000 LBS

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Health Hazards Data

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LD50 LC50 Mixture: ORAL LD50(RAT) >5.00 G/KG.
 Route Of Entry Inds - Inhalation: YES
 Skin: YES
 Ingestion: NO
 Carcinogenicity Inds - NTP: YES
 IARC: YES
 OSHA: YES
 Effects of Exposure: EYE:MAY CAUSE IRRIT,EXPERIENCE MILD DISCOMFT,SLIGHT EXCESS REDNESS.SKIN:BRIEF CONTACT MAY CAUSE SLIGHT IRRIT.PROLONG CONTACT MAY CAUSE MORE SEVERE IRRIT,DISCOMFT,LOCAL REDNESS,SWELLING.PROL/WIDEPREAD/REP CONTACT MAY RESULT IN ABSORPT OF POT HARMFUL AMTS OF MATL.INHAL:VAP/MIST IRTI NOSE/THROAT.INGEST:MORE THAN (SUPPL)
 Explanation Of Carcinogenicity: PER MSDS:PRODUCT &/OR COMPONENT(S) CARCINOGENIC ACCORDING TO OSHA/IARC/NTP/OTHER. BENZENE. CA PROP 65.
 Signs And Symptions Of Overexposure: INHAL:DIZZ,DROWS,EUPHORIA,LOSS OF COORD,DISORIENT,HEAD,NAU,VOMIT.POORLY VENTI AREA/CONF SPACE UNCONSC,ASPHYXIATION.PROL/REP OVEREXPO ABSORPT OF POT HARMFUL AMTS OF MATL.SEE HEALTH HAZ ABOVE.CHRONIC:PROL/REP ETHANOL VAP EXPO-HEAD,LACK OF COO RD,SLEEPINESS,FTG,DIFF CONC.CHRONIC ALCOHOLIC BEV-LIVER/STOM/HEART/NERV SYS DMG.
 Medical Cond Aggravated By Exposure: BECAUSE OF ITS IRRIT PROPERTIES,REPEATED SKIN CONTACT MAY AGGRAVATE EXISTING DERM(SKIN CONDITION).
 First Aid: EYE:IMMED FLUSH W/LOTS OF H2O @LEAST 15MINS,HOLD EYELIDS APART.GET MED ATTN.SKIN:WASH W/LOTS OF SOAP/H2O SEVERAL MINS.IRRIT DVLPS/PERSIST GET MED ATTN.INGEST:CONSC/CAN SWALLO GIVE 2GLASSES H2O(16OZ),DONT INDUCE VOMIT.VOMIT OCCURS GIVE FLUID S AGAIN.DETERMINE STOMAC EVACUATION/VOMIT INDUCTION BY MED PERSONNEL.DONT GIVE ANYTHING BY MOUTH IF UNCONSC/CONVULS.INHAL:MOVE TO FRESH AIR.NOT BREATH/RESP(SUP)

===== Handling and Disposal =====

Spill Release Procedures: REMOVE ALL IGN SOURCE INCLUDE INTERNAL COMBUST
 ENGINES/POWER TOOLS. VENTI AREA. BARRICADE AREA. STAY UPWIND, WARN OF POSSIBLE
 DOWNWIDE EXPLO HAZ. AVOID BREATH VAP/SKIN/EYE/CLOTH CONTACT. PRESSURE DEMAND
 AIR SUP RESP-CONTAM/OXY UNK CONC. PPE. >714LB S SARA 304

Neutralizing Agent: NONE SPECIFIED BY MANUFACTURER.

Waste Disposal Methods: MATL PRESENTLY CONSTITUTED HAS RCRA CLASSIF OF BENZENE
 TOXIC/IGN. DISCARD IN PRESENT FORM HAZ WASTE D018/D001. RCRA-USER RESPON TO
 DETERMINE WHETHER PROD MEETS RCRA CRITERIA FOR HAZ WASTE @DISPO
 TIME. USE/TRANSFORM/MIX/ETC CHANGE CLASSIF. DONT (OTH PREC)

Handling And Storage Precautions: MATL MAY BE @ELEVATED TEMP &/OR
 PRESSURES. EXERCISE ARE WHEN OPN BLEEDERS/SMPL PORTS. GROUND/BOND SHIP
 CNTNR, TRANSF LINE, REC CNTNR.

Other Precautions: KEEP AWAY FRM HEAT/SPARK/FLAME/OTHER IGN
 SOURCES. PRODINTENDED FO9R USE AS MOTOR FUEL ONLY. USE NONSPARK
 TOOLS, GROUND/BOND ALL CNTNRS. DISPO: ALLOW TO ENTER DRAIN/SEWER. CAN CAUSE
 EXPLO. CONTAINS SEC 313 TOXIC CHEM/CERCLA 102 CHEMS.

===== Fire and Explosion Hazard Information =====

Flash Point Method: PMCC

Flash Point: -40.C, -40.F

Lower Limits: 1.4

Upper Limits: 7.6

Extinguishing Media: H2O INEFFECTIVE ON FLAMES. USE WATER SPRAY, DRY
 CHEMICAL, ALCOHOL RESISTANT FOAM, CO2 TO EXTINGUISH FIRE.

Fire Fighting Procedures: H2O SHOULD BE USED TO COOL FIRE-EXPO CNTNR/PROVIDE
 PROTECTION FOR PERSONS ATTEMPTING TO STOP LEAK. WEAR FULL PROTECTIVE CLOTH
 & POSITIVE PRESSURE BREATH APPARATU

Unusual Fire/Explosion Hazard: VAP HEAVIER THAN AIR, TRAVEL CONSIDERABLE
 DISTANCE TO IGN SOURCE-FLASHBK. FLOWING MATL GENERATE STATIC ELECT, CAUSE FIRE
 EXPO W/SPARK IN FLAM VAP-AIR ATM. EXT FLAMM

===== Control Measures =====

Respiratory Protection: AIRBORNE CONC SHOULD BE KEPT TO LOWEST LEVELS
 POSSIBLE. VAP/MIST/DUST GENERATED & OCCUPAT EXPO LIMIT OF PROD/COMPO
 EXCEEDED USE APPRO NIOSH/MSHA APPROV AIR PURIFY/AIR SUPPL RES AFT DETERM
 AIRBORNE CONTAM CONC. AIR SUPPL RES-CONTAM CON/OXY UNK

Ventilation: EXPLO-PROOF EQPMT-MAINTAIN ADEQ VENTI TO MEET OCCUP EXP
 LIMITS. PREVENT EXPO AIR-GAS MIX ACCUMM, AVOID SIGN OXY DISPLACE.

Protective Gloves: NITRILE RUBB, TEFLON, VITRON-RESIST TO PET

Eye Protection: SAF GLASSES, CHEM TYP GOGG, FCSHIELD

Other Protective Equipment: PROTECGIVE CLOTH-COVERALLS, BOOTS. OXY LEVELS SHOULD
 BE @LEAST 19.5% IN CONFINED SPACE/OTHER WORKAREA.

Work Hygienic Practices: REMOVE/DRY CLEAN (MORE EFFECTIVE)/LAUNDRY CLOTH
 SOAK/SOIL W/MATL BEF REUSE. INFORM CLOTH CLEANERS OF POT HAZ W/CONTAM CLOT

Supplemental Safety and Health: HEALTH: SEVERAL MOUTHFULS SWALLOW ABD
 DISCOMFT, NAU, DIARR MAY OCCUR. ASPIRATION MAY OCCUR DURING SWALLOW/VOMIT RESULT
 IN LUNG DMG. 1ST AID: DISTRESS CLEAR AIRWAY, START ART RESP. W/DR ADVICE GIVE
 SUPPL OXY W/BAG-VALV MASK/MANUAL TRIG OXY SUPPLY. STO MACH EVAC-USE METHOD
 LEAST LIKELY TO CAUSE ASPIRATION. DISPO: ENTER DRAIN/SEWERS.

===== Physical/Chemical Properties =====

HCC: F1

Boiling Point: >32.2C, 90.F

Vapor Pres: 300-700

Vapor Density: 3-4

Spec Gravity: 0.7-0.77

PH: NA

Evaporation Rate & Reference: NONE SPECIFIED BY MANUFA.

Solubility in Water: 0.1-1, SLIGHT

Appearance and Odor: LIGHT RED TO LIGHT STRAW LIQUID, PETROLEUM ODOR

=====
Reactivity Data

=====
Stability Condition To Avoid: HEAT, IGN SOURCES.

Materials To Avoid: HEAT, STRONG OXIDIZERS

Hazardous Decomposition Products: TOXIC LEVELS OF CARBON MONOXIDE, CARBON DIOXIDE, IRRIT ALDEHYDES & KETONES.

Hazardous Polymerization Indicator: NO

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Toxicological Information

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Ecological Information

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MSDS Transport Information

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Regulatory Information

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Other Information

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Transportation Information

Responsible Party Code: 2R503

Trans ID NO: 121756

Product ID: 00365 TEXACO UNLEADED GASOLINE (26000 UNLEADED REG GASOLINE)

MSDS Prepared Date: 05/19/1997

Review Date: 07/15/1998

MFN: 1

Net Unit Weight: 320.6 LBS

Multiple KIT Number: 0

Review IND: Y

Unit Of Issue: DR

Container QTY: 55 GALLON

Type Of Container: DRUM

Additional Data: PER MSDS: DOT PROPER SHIPPING NAME: GASOLINE, HAZ CLASS 3, UN1203, PKG II, FLAMM LIQ LABEL.

=====
Detail DOT Information

=====
DOT PSN Code: GTN

DOT Proper Shipping Name: GASOLINE

Hazard Class: 3

UN ID Num: UN1203

DOT Packaging Group: II

Label: FLAMMABLE LIQUID

Special Provision: B33, B101, T8

Non Bulk Pack: 202

Bulk Pack: 242

Max Qty Pass: 5 L

Max Qty Cargo: 60 L

Vessel Stow Req: E

=====
Detail IMO Information

=====
IMO PSN Code: HRV

IMO Proper Shipping Name: GASOLINE

IMDG Page Number: 3141

UN Number: 1203

UN Hazard Class: 3.1
 IMO Packaging Group: II
 Subsidiary Risk Label: -
 EMS Number: 3-07
 MED First Aid Guide NUM: 311

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Detail IATA Information

=====

IATA PSN UC
 IATA UN ID Num: 1203
 IATA Proper Shipping Name: GASOLINE
 IATA UN Class: 3
 IATA Label: FLAMMABLE LIQUID
 UN Packing Group: II
 Packing Note Passenger: 305
 Max Quant Pass: 5L
 Max Quant Cargo: 60L
 Packaging Note Cargo: 307
 Exceptions: A100

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Detail AFI Information

=====

AFI PSN UC
 AFI Proper Shipping Name: GASOLINE
 AFI Hazard Class: 3
 AFI UN ID NUM: UN1203
 AFI Packing Group: II
 Special Provisions: P5
 Back Pack Reference: A7.3

=====

HAZCOM Label

=====

Product ID: 00365 TEXACO UNLEADED GASOLINE (26000 UNLEADED REG GASOLINE)
 Cage: 2R503
 Company Name: TEXACO REFINING AND MARKETING INC
 Street: 1111 RUSK ST
 City: HOUSTON TX
 Zipcode: 77002-3310
 Health Emergency Phone: 914-831-3400/800-424-9300 (CHEMTREC)
 Label Required IND: Y
 Date Of Label Review: 07/15/1998
 Status Code: C
 Label Date: 07/15/1998
 Origination
 Chronic Hazard IND: Y
 Eye Protection IND: YES
 Skin Protection IND: YES
 Signal Word: DANGER
 Respiratory Protection IND: YES
 Health Hazard: Moderate
 Contact Hazard: Moderate
 Fire Hazard: Severe
 Reactivity Hazard: None
 Hazard And Precautions: EXTREMELY FLAMM LIQ/VAP.VAP CAN CAUSE FLASH FIRE.MAY
 CAUSE DIZZ/DROWS.MAY CAUSE EYE IRRIT.ASPIRATION HAZ IF INGEST.CAN ENTER
 LUNGS,CAUSE DMG.ATTN:POSSIBLE CANC HAZ-MAY CAUSE CANC BASED ON ANIMAL
 DATA.1ST AID:EYE:IMMED FLUSH W/LOTS OF H2O @LE AST 15MINS,HOLD EYELIDS
 APART.GET MED ATTN.SKIN:WASH W/LOTS OF SOAP/H2O SEVERAL MINS.IRRIT
 DVLPS/PERSIST GET MED ATTN.INGEST:CONSC/CAN SWALLO GIVE 2GLASSES
 H2O(16OZ),DONT INDUCE VOMIT.VOMIT OCCURS GIVE FLUIDS AGAIN.DETERMINE STOMAC
 EVACUATI ON/VOMIT INDUCTION BY MED PERSONNEL.DONT GIVE ANYTHING BY MOUTH IF
 UNCONSC/CONVULS.INHAL:MOVE TO FRESH AIR.NOT BREATH/RESP/SUPPL OXY.TARGET
 ORGANS:LUNGS,EYE,CNS.

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International Chemical Safety Cards

DIBENZ(a,h)ANTHRACENE

ICSC: 0431

DIBENZO(a,h)ANTHRACENE 1,2:5,6-Dibenzanthracene C ₂₂ H ₁₄ Molecular mass: 278.4			
CAS # 53-70-3 RTECS # HN2625000 ICSC # 0431 EC # 601-041-00-2			
TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE	Combustible.	NO open flames.	Water spray, powder.
EXPLOSION			
EXPOSURE		AVOID ALL CONTACT!	
• INHALATION		Local exhaust or breathing protection.	Fresh air, rest.
• SKIN	Redness. Swelling. Itching.	Protective gloves. Protective clothing.	Remove contaminated clothes. Rinse and then wash skin with water and soap.
• EYES	Redness.	Face shield, or eye protection in combination with breathing protection.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
• INGESTION		Do not eat, drink, or smoke during work. Wash hands before eating.	Rinse mouth.
SPILLAGE DISPOSAL		STORAGE	PACKAGING & LABELLING
Sweep spilled substance into sealable containers; if appropriate, moisten first to prevent dusting. Carefully collect remainder, then remove to safe place (extra personal protection: P3 filter respirator for toxic particles).		Well closed.	T symbol R: 45 S: 53-45
SEE IMPORTANT INFORMATION ON BACK			
ICSC: 0431		Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities © IPCS CEC 1993	

International Chemical Safety Cards

DIBENZ(a,h)ANTHRACENE

ICSC: 0431

<p>I M P O R T A N T D A T A</p>	<p>PHYSICAL STATE; APPEARANCE: COLOURLESS CRYSTALLINE POWDER.</p> <p>PHYSICAL DANGERS:</p> <p>CHEMICAL DANGERS:</p> <p>OCCUPATIONAL EXPOSURE LIMITS (OELs): TLV not established.</p> <p>ROUTES OF EXPOSURE: The substance can be absorbed into the body by inhalation, through the skin and by ingestion.</p> <p>INHALATION RISK: Evaporation at 20°C is negligible; a harmful concentration of airborne particles can, however, be reached quickly.</p> <p>EFFECTS OF SHORT-TERM EXPOSURE:</p> <p>EFFECTS OF LONG-TERM OR REPEATED EXPOSURE: The substance may have effects on the skin, resulting in photosensitization. This substance is probably carcinogenic to humans.</p>
PHYSICAL PROPERTIES	<p>Boiling point: 524°C Melting point: 267°C Relative density (water = 1): 1.28</p> <p>Solubility in water: none Octanol/water partition coefficient as log Pow: 6.5</p>
ENVIRONMENTAL DATA	In the food chain important to humans, bioaccumulation takes place, specifically in seafood.
NOTES	
This is one of many polycyclic aromatic hydrocarbons - standards are usually established for them as mixtures, e.g., coal tar pitch volatiles. However, it may be encountered as a laboratory chemical in its pure form. Insufficient data are available on the effect of this substance on human health, therefore utmost care must be taken. Do NOT take working clothes home. DBA is a commonly used name. This substance is one of many polycyclic aromatic hydrocarbons (PAH).	
ADDITIONAL INFORMATION	
ICSC: 0431	DIBENZ(a,h)ANTHRACENE
© IPCS, CEC, 1993	

**IMPORTANT
LEGAL
NOTICE:**

Neither the CEC or the IPCS nor any person acting on behalf of the CEC or the IPCS is responsible for the use which might be made of this information. This card contains the collective views of the IPCS Peer Review Committee and may not reflect in all cases all the detailed requirements included in national legislation on the subject. The user should verify compliance of the cards with the relevant legislation in the country of use.

International Chemical Safety Cards

BENZO(B)FLUORANTHENE

ICSC: 0720

BENZO(B)FLUORANTHENE
Benzo(e)acephenanthrylene
2,3-Benzofluoroanthene
 $C_{20}H_{12}$
Molecular mass: 252.3

CAS # 205-99-2
RTECS # CU1400000
ICSC # 0720

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE	Combustible.	NO open flames.	Water spray, powder.
EXPLOSION			
EXPOSURE		PREVENT DISPERSION OF DUST! STRICT HYGIENE! AVOID ALL CONTACT!	IN ALL CASES CONSULT A DOCTOR!
• INHALATION		Local exhaust or breathing protection.	Fresh air, rest.
• SKIN	MAY BE ABSORBED!	Protective gloves. Protective clothing.	Remove contaminated clothes. Rinse and then wash skin with water and soap. Refer for medical attention. Wear protective gloves when administering first aid.
• EYES		Safety goggles or eye protection in combination with breathing protection.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
• INGESTION		Do not eat, drink, or smoke during work.	Wear protective gloves when inducing vomiting. Induce vomiting (ONLY IN CONSCIOUS PERSONS!). Refer for medical attention.
SPILLAGE DISPOSAL		STORAGE	PACKAGING & LABELLING
Sweep spilled substance into containers. Carefully collect remainder, then remove to safe place. Do NOT let this chemical enter the environment.		Provision to contain effluent from fire extinguishing. Tightly closed.	Unbreakable packaging; put breakable packaging into closed unbreakable container.
SEE IMPORTANT INFORMATION ON BACK			
ICSC: 0720		Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities © IPCS CEC 1993	

International Chemical Safety Cards

BENZO(B)FLUORANTHENE

ICSC: 0720

I M P O R T A N T D A T A	<p>PHYSICAL STATE; APPEARANCE: COLOURLESS TO YELLOW CRYSTALS.</p> <p>PHYSICAL DANGERS:</p> <p>CHEMICAL DANGERS: Upon heating, toxic fumes are formed.</p> <p>OCCUPATIONAL EXPOSURE LIMITS (OELs): TLV not established.</p> <p>ROUTES OF EXPOSURE: The substance can be absorbed into the body by inhalation of its aerosol and through the skin.</p> <p>INHALATION RISK: Evaporation at 20°C is negligible; a harmful concentration of airborne particles can, however, be reached quickly.</p> <p>EFFECTS OF SHORT-TERM EXPOSURE:</p> <p>EFFECTS OF LONG-TERM OR REPEATED EXPOSURE: This substance is possibly carcinogenic to humans.</p>
PHYSICAL PROPERTIES	<p>Melting point: 168°C Solubility in water: none</p> <p>Vapour pressure, Pa at 20°C: <10 Octanol/water partition coefficient as log Pow: 6.04</p>
ENVIRONMENTAL DATA	<p>This substance may be hazardous to the environment; special attention should be given to the total environment. In the food chain important to humans, bioaccumulation takes place, specifically in oils and fats.</p>
NOTES	
<p>Depending on the degree of exposure, periodic medical examination is indicated. Data are insufficiently available on the effect of this substance on human health, therefore utmost care must be taken. Do NOT take working clothes home.</p>	
ADDITIONAL INFORMATION	
ICSC: 0720	BENZO(B)FLUORANTHENE
<p>© IPCS, CEC, 1993</p>	
IMPORTANT LEGAL NOTICE:	<p>Neither the CEC or the IPCS nor any person acting on behalf of the CEC or the IPCS is responsible for the use which might be made of this information. This card contains the collective views of the IPCS Peer Review Committee and may not reflect in all cases all the detailed requirements included in national legislation on the subject. The user should verify compliance of the cards with the relevant legislation in the country of use.</p>

**** SECTION 1 - CHEMICAL PRODUCT AND COMPANY IDENTIFICATION ****

MSDS Name: Benzo[k]fluoranthene, 99+% (tlc)

Catalog Numbers:

AC279730000, AC279732500

Synonyms:

8,9-Benzofluoranthene.

Company Identification (Europe): Acros Organics BVBA

Janssen Pharmaceuticaaan 3a

2440 Geel, Belgium

Company Identification (USA):

Acros Organics

One Reagent Lane

Fairlawn, NJ 07410

For information in North America, call: 800-ACROS-01

For information in Europe, call: 0032(0) 14575211

For emergencies in the US, call CHEMTREC: 800-424-9300

For emergencies in Europe, call: 0032(0) 14575299

**** SECTION 2 - COMPOSITION, INFORMATION ON INGREDIENTS ****

CAS#	Chemical Name	%	EINECS#
207-08-9	Benzo[k]fluoranthene, 99+% (TLC)	99%	205-916-6

Hazard Symbols: T

Risk Phrases: 45

**** SECTION 3 - HAZARDS IDENTIFICATION ****

EMERGENCY OVERVIEW

May cause cancer.Toxic.Carcinogen.

Potential Health Effects

Eye:

Causes eye irritation.

Skin:

Causes skin irritation. May be fatal if absorbed through the skin.

Ingestion:

May be fatal if swallowed. Causes gastrointestinal irritation with nausea, vomiting and diarrhea.

Inhalation:

May be fatal if inhaled. Causes respiratory tract irritation.

Chronic:

May cause cancer according to animal studies.

**** SECTION 4 - FIRST AID MEASURES ****

Eyes:

Immediately flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Get medical aid immediately.

Skin:

Get medical aid. Immediately flush skin with plenty of soap and water for at least 15 minutes while removing contaminated clothing and shoes.

Ingestion:

If victim is conscious and alert, give 2-4 cupfuls of milk or water. Never give anything by mouth to an unconscious person. Get medical aid immediately. Induce vomiting by giving one teaspoon of Syrup of Ipecac.

Inhalation:

Get medical aid immediately. Remove from exposure to fresh air immediately. If not breathing, give artificial respiration. If breathing is difficult, give oxygen.

Notes to Physician:

**** SECTION 5 - FIRE FIGHTING MEASURES ****

General Information:

As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. During a fire, irritating and highly toxic gases may be generated by thermal decomposition or combustion.

Extinguishing Media:

Use water spray, dry chemical, carbon dioxide, or chemical foam.

**** SECTION 6 - ACCIDENTAL RELEASE MEASURES ****

General Information: Use proper personal protective equipment as indicated in Section 8.

Spills/Leaks:

Vacuum or sweep up material and place into a suitable disposal container. Clean up spills immediately, observing precautions in the Protective Equipment section.

**** SECTION 7 - HANDLING and STORAGE ****

Handling:

Wash thoroughly after handling. Wash hands before eating. Remove contaminated clothing and wash before reuse. Use only in a well-ventilated area. Do not breathe dust, vapor, mist, or gas. Do not get on skin or in eyes. Do not ingest or inhale.

Storage:

Store in a cool, dry place. Store in a tightly closed container.

**** SECTION 8 - EXPOSURE CONTROLS, PERSONAL PROTECTION ****

Engineering Controls:

Use process enclosure, local exhaust ventilation, or other engineering controls to control airborne levels below recommended exposure limits.

Personal Protective Equipment

Eyes:

Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.

Skin:

Wear appropriate protective gloves to prevent skin exposure.

Clothing:

Wear appropriate protective clothing to prevent skin exposure.

Respirators:

Follow the OSHA respirator regulations found in 29CFR 1910.134 or European Standard EN 149. Always use a NIOSH or European Standard EN 149 approved respirator when necessary.

**** SECTION 9 - PHYSICAL AND CHEMICAL PROPERTIES ****

Physical State:	Solid
Appearance:	yellow
Odor:	Not available.
pH:	Not available.
Vapor Pressure:	Not available.
Vapor Density:	Not available.
Evaporation Rate:	Not available.
Viscosity:	Not available.
Boiling Point:	480 deg C @ 760.00mm Hg
Freezing/Melting Point:	216 - 218 deg C
Autoignition Temperature:	Not available.
Flash Point:	Not available.
Explosion Limits, lower:	Not available.
Explosion Limits, upper:	Not available.
Decomposition Temperature:	
Solubility:	

Specific Gravity/Density:
Molecular Formula: C20H12
Molecular Weight: 252.32

**** SECTION 10 - STABILITY AND REACTIVITY ****

Chemical Stability:
Stable under normal temperatures and pressures.
Conditions to Avoid:
Incompatible materials, dust generation.
Incompatibilities with Other Materials:
Strong oxidants.
Hazardous Decomposition Products:
Carbon monoxide, carbon dioxide.
Hazardous Polymerization: Has not been reported.

**** SECTION 11 - TOXICOLOGICAL INFORMATION ****

RTECS#:
CAS# 207-08-9: DF6350000
LD50/LC50:
Not available.
Carcinogenicity:
Benzo[k]fluoranthene, 99+% (TLC) -
California: carcinogen; initial date 7/1/87
NTP: Suspect carcinogen
OSHA: Possible Select carcinogen
IARC: Group 2B carcinogen
Mutagenicity:
Samonella typhimurium : 105g/plate

**** SECTION 12 - ECOLOGICAL INFORMATION ****

Ecotoxicity:
From calc logKow of 6.84, the est bioconc factor for fish is 144.
However no accum is likely due to the pres of microsomal mixed funct
oxidases which enables it to be metabolised (Lyman,W.J. Handb of
chem.prop est meth. Env behaviour of org chem 1982; Santodonato, J.
Health and ecol assessment of polynucl arom hydrocarb. 1981)
Short-necked clam cultured in artif seawater at 21-250C for 10 days
revealed a decr in benzo[k].. of ca 20% on day 8. When clams were
placed in a basket and kept in harbour water, only a small incr in
polycycl arom hydrocarb were found.

**** SECTION 13 - DISPOSAL CONSIDERATIONS ****

Dispose of in a manner consistent with federal, state, and local regulations.

**** SECTION 14 - TRANSPORT INFORMATION ****

US DOT
No information available
Canadian TDG
No information available.

**** SECTION 15 - REGULATORY INFORMATION ****

US FEDERAL
TSCA
CAS# 207-08-9 is not listed on the TSCA inventory.
It is for research and development use only.
This material does not contain any Class 2 Ozone depleters.
Clean Water Act:
None of the chemicals in this product are listed as Hazardous
Substances under the CWA.
CAS# 207-08-9 is listed as a Priority Pollutant under the Clean Water
Act.
None of the chemicals in this product are listed as Toxic Pollutants
under the CWA.
OSHA:

None of the chemicals in this product are considered highly hazardous by OSHA.

STATE

Benzo[k]fluoranthene, 99+% (TL can be found on the following state right to know lists: California, New Jersey, Florida, Pennsylvania, Minnesota, Massachusetts.

The following statement(s) is(are) made in order to comply with the California Safe Drinking Water Act:

WARNING: This product contains Benzo[k]fluoranthene, 99+% (TL, a chemical known to the state of California to cause cancer.

California No Significant Risk Level:

None of the chemicals in this product are listed.

European/International Regulations

European Labeling in Accordance with EC Directives

Hazard Symbols: T

Risk Phrases:

R 45 May cause cancer.

Safety Phrases:

S 53 Avoid exposure - obtain special instructions before use.

S 45 In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).

WGK (Water Danger/Protection)

CAS# 207-08-9: No information available.

United Kingdom Occupational Exposure Limits

Canada

None of the chemicals in this product are listed on the DSL/NDSL list.

CAS# 207-08-9 is not listed on Canada's Ingredient Disclosure List.

Exposure Limits

CAS# 207-08-9: OEL-FRANCE;Carcinogen

**** SECTION 16 - ADDITIONAL INFORMATION ****

MSDS Creation Date: 9/02/1997 Revision #2 Date: 8/02/2000

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no way shall the company be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever arising, even if the company has been advised of the possibility of such damages.

MSDS **Material Safety Data Sheet**

From: Mallinckrodt Baker, Inc.
222 Red School Lane
Phillipsburg, NJ 08865



Mallinckrodt
CHEMICALS



24 Hour Emergency Telephone: 800-858-2151
CHEMTREC: 1-800-424-9300

National Response in Canada
CANUTEC: 613-968-4686

Outside U.S. and Canada
Chemtree: 703-627-3887

NOTE: CHEMTREC, CANUTEC and National Response Center emergency numbers to be used only in the event of chemical emergencies involving a spill, leak, fire, exposure or accident involving chemicals.

All non-emergency questions should be directed to Customer Service (1-800-582-2537) for assistance.

DIOCTYLPHTHALATE

MSDS Number: E6500 — *Effective Date: 03/05/97*

1. Product Identification

Synonyms: Di-(2-ethylhexyl)phthalate; DEHP; bis(2-ethylhexyl)phthalate; DOP; 1,2-Benzenedicarboxylic acid, bis(2-ethylhexyl)ester; Di-sec-octyl phthalate

CAS No.: 117-81-7

Molecular Weight: 390.56

Chemical Formula: C₂₄H₃₈O₄

Product Codes: H187

2. Composition/Information on Ingredients

Ingredient	CAS No	Percent	Hazardous
Di-sec-octyl Phthalate	117-81-7	100%	Yes

3. Hazards Identification**Emergency Overview**

WARNING! HARMFUL IF SWALLOWED OR INHALED. CAUSES IRRITATION TO SKIN, EYES AND RESPIRATORY TRACT. AFFECTS THE CENTRAL NERVOUS SYSTEM, LIVER, REPRODUCTIVE SYSTEM, AND GASTROINTESTINAL TRACT. POSSIBLE CANCER HAZARD. MAY CAUSE CANCER BASED ON ANIMAL DATA. Risk of cancer depends on duration and

level of exposure. **MAY CAUSE ADVERSE REPRODUCTIVE EFFECTS.**

Potential Health Effects

Inhalation:

The low vapor pressure of this material essentially eliminates inhalation hazards unless the material is heated or misted. Inhalation of mists can cause nausea and is irritating to the respiratory tract.

Ingestion:

Ingestion causes nausea, abdominal cramps, diarrhea. CNS depression - lethargy, drowsiness, staggering and sleepiness - can result from absorbing large amounts.

Skin Contact:

Slight skin irritation may occur from prolonged skin contact. Low levels may be absorbed through the skin.

Eye Contact:

Causes irritation, redness, and pain.

Chronic Exposure:

Material is a suspected carcinogen and a suspected teratogen.

Aggravation of Pre-existing Conditions:

No information found.

4. First Aid Measures

Inhalation:

Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

Ingestion:

Do NOT induce vomiting. Give large amounts of water. Never give anything by mouth to an unconscious person. Get medical attention.

Skin Contact:

Immediately flush skin with plenty of water for at least 15 minutes. Remove contaminated clothing and shoes. Get medical attention. Wash clothing before reuse. Thoroughly clean shoes before reuse.

Eye Contact:

Immediately flush eyes with plenty of water for at least 15 minutes, lifting lower and upper eyelids occasionally. Get medical attention immediately.

5. Fire Fighting Measures

Fire:

Flash point: 215C (419F) OC Autoignition temperature: 390C (734F) Flammable limits in air % by volume: 1el: 0.3 Slight fire hazard.

Explosion:

Above the flash point, explosive vapor-air mixtures may be formed.

Fire Extinguishing Media:

Water spray, dry chemical, alcohol foam, or carbon dioxide.

Special Information:

In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode.

6. Accidental Release Measures

Ventilate area of leak or spill. Remove all sources of ignition. Wear appropriate personal protective equipment as specified in Section 8. Isolate hazard area. Keep unnecessary and unprotected personnel from entering. Contain and recover liquid when possible. Use non-sparking tools and equipment. Collect liquid in an appropriate container or absorb with an inert material (e. g., vermiculite, dry sand, earth), and place in a chemical waste container. Do not use combustible materials, such as saw dust. Do not flush to sewer! US Regulations (CERCLA) require reporting spills and releases to soil, water and air in excess of reportable quantities. The toll free number for the US Coast Guard National Response Center is (800) 424-8802.

7. Handling and Storage

Keep in a tightly closed container, stored in a cool, dry, ventilated area. Protect against physical damage. Wear special protective equipment (Sec. 8) for maintenance break-in or where exposures may exceed established exposure levels. Wash hands, face, forearms and neck when exiting restricted areas. Shower, dispose of outer clothing, change to clean garments at the end of the day. Avoid cross-contamination of street clothes. Wash hands before eating and do not eat, drink, or smoke in workplace. Containers of this material may be hazardous when empty since they retain product residues (vapors, liquid); observe all warnings and precautions listed for the product.

8. Exposure Controls/Personal Protection

Airborne Exposure Limits:

- OSHA Permissible Exposure Limit (PEL): 5 mg/m³ (TWA). - ACGIH Threshold Limit Value (TLV): 5 mg/m³ (TWA), 10 mg/m³ (STEL); A3 - animal carcinogen.

Ventilation System:

A system of local and/or general exhaust is recommended to keep employee exposures below the Airborne Exposure Limits. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area. Please refer to the ACGIH document, *Industrial Ventilation, A Manual of Recommended Practices*, most recent edition, for details.

Personal Respirators (NIOSH Approved):

If the exposure limit is exceeded, a full facepiece respirator with dust/mist filter may be worn up to 50 times the exposure limit or the maximum use concentration specified by the appropriate regulatory agency or respirator supplier, whichever is lowest. For emergencies or instances where the exposure levels are not known, use a full-facepiece positive-pressure, air-supplied respirator. WARNING: Air purifying respirators do not protect workers in oxygen-deficient atmospheres.

Skin Protection:

Wear impervious protective clothing, including boots, gloves, lab coat, apron or coveralls, as appropriate, to prevent skin contact.

Eye Protection:

Use chemical safety goggles and/or a full face shield where splashing is possible. Maintain eye wash fountain and quick-drench facilities in work area.

9. Physical and Chemical Properties

Appearance:

Clear oily liquid.

Odor:

Slightly amine to odorless.

Solubility:

Insoluble in water.

Specific Gravity:

0.9861 @ 20C/20C

pH:

No information found.

% Volatiles by volume @ 21C (70F):

No information found.

Boiling Point:

230C (446F)

Melting Point:

-50C (-58F)

Vapor Density (Air=1):

16

Vapor Pressure (mm Hg):

1.32 @ 200C (392F)

Evaporation Rate (BuAc=1):

No information found.

10. Stability and Reactivity

Stability:

Stable under ordinary conditions of use and storage.

Hazardous Decomposition Products:

Carbon dioxide and carbon monoxide may form when heated to decomposition.

Hazardous Polymerization:

Will not occur.

Incompatibilities:

Nitrates, strong oxidizers, acids and alkalis.

Conditions to Avoid:

Heat, flames, ignition sources and incompatibles.

11. Toxicological Information

Oral rat LD50: 30 g/kg; Skin rabbit LD50: 25 g/kg. Irritation Data (rabbit, std Draize, 500mg/24H): Skin, mild; Eye, mild. Investigated as a tumorigen, mutagen, reproductive effector.

-----\Cancer Lists\-----			
Ingredient	---NTP Carcinogen---		IARC Category
	Known	Anticipated	
Di-sec-octyl Phthalate (117-81-7)	No	Yes	2B

12. Ecological Information

Environmental Fate:

When released into water, this material may biodegrade to a moderate extent. This material may bioaccumulate to some extent. When released into the air, this material may be removed from the atmosphere to a moderate extent by wet deposition.

Environmental Toxicity:

The LC50/96-hour values for fish are over 100 mg/l.

13. Disposal Considerations

Whatever cannot be saved for recovery or recycling should be handled as hazardous waste and sent to a RCRA approved waste facility. Processing, use or contamination of this product may change the waste management options. State and local disposal regulations may differ from federal disposal regulations. Dispose of container and unused contents in accordance with federal, state and local requirements.

14. Transport Information

Not regulated.

15. Regulatory Information

-----\Chemical Inventory Status - Part 1\-----				
Ingredient	TSCA	EC	Japan	Australia
Di-sec-octyl Phthalate (117-81-7)	Yes	Yes	Yes	Yes
-----\Chemical Inventory Status - Part 2\-----				
Ingredient	Korea	--Canada--		Phil.
		DSL	NDSL	
Di-sec-octyl Phthalate (117-81-7)	Yes	Yes	No	Yes
-----\Federal, State & International Regulations - Part 1\-----				
Ingredient	-SARA 302-		-SARA 313-	
	RQ	TPQ	List	Chemical Catg.
Di-sec-octyl Phthalate (117-81-7)	No	No	Yes	No
-----\Federal, State & International Regulations - Part 2\-----				
Ingredient	CERCLA	-RCRA-	-TSCA-	
		261.33	8(d)	

Di-sec-octyl Phthalate (117-81-7)

100

U028

No

Chemical Weapons Convention: No TSCA 12(b): Yes CDTA: Yes
SARA 311/312: Acute: Yes Chronic: Yes Fire: No Pressure: No
Reactivity: No (Pure / Liquid)

Prop 65:

THIS PRODUCT CONTAINS A CHEMICAL(S) KNOWN TO THE STATE OF CALIFORNIA TO CAUSE CANCER.

Australian Hazchem Code: No information found.

Poison Schedule: No information found.

WHMIS:

This MSDS has been prepared according to the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR.

16. Other Information

NFPA Ratings: Health: 1 Flammability: 1 Reactivity: 0

Label Hazard Warning:

WARNING! HARMFUL IF SWALLOWED OR INHALED. CAUSES IRRITATION TO SKIN, EYES AND RESPIRATORY TRACT. AFFECTS THE CENTRAL NERVOUS SYSTEM, LIVER, REPRODUCTIVE SYSTEM, AND GASTROINTESTINAL TRACT. POSSIBLE CANCER HAZARD. MAY CAUSE CANCER BASED ON ANIMAL DATA. Risk of cancer depends on duration and level of exposure. MAY CAUSE ADVERSE REPRODUCTIVE EFFECTS.

Label Precautions:

Do not get in eyes, on skin, or on clothing. Do not breathe mist. Keep container closed. Use only with adequate ventilation. Wash thoroughly after handling.

Label First Aid:

If swallowed, DO NOT INDUCE VOMITING. Give large quantities of water. Never give anything by mouth to an unconscious person. If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. In case of contact, immediately flush eyes or skin with plenty of water for at least 15 minutes. Remove contaminated clothing and shoes. Wash clothing before reuse. In all cases, get medical attention.

Product Use:

Laboratory Reagent.

Revision Information:

Pure. New 16 section MSDS format, all sections have been revised.

Disclaimer:

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Prepared by: Strategic Services Division
Phone Number: (314) 539-1600 (U.S.A.)

**** SECTION 1 - CHEMICAL PRODUCT AND COMPANY IDENTIFICATION ****

MSDS Name: Chrysene, 98%

Catalog Numbers:

AC224140000, AC224140010, AC224140050, AC224145000

Synonyms:

1,2 Benzophenanthrene, Benzo(a)phenanthrene.

Company Identification (Europe): Acros Organics BVBA

Janssen Pharmaceuticalaan 3a

2440 Geel, Belgium

Company Identification (USA):

Acros Organics

One Reagent Lane

Fairlawn, NJ 07410

For information in North America, call: 800-ACROS-01

For information in Europe, call: 0032(0) 14575211

For emergencies in the US, call CHEMTREC: 800-424-9300

For emergencies in Europe, call: 0032(0) 14575299

**** SECTION 2 - COMPOSITION, INFORMATION ON INGREDIENTS ****

CAS#	Chemical Name	%	EINECS#
218-01-9	Chrysene	98.0	205-923-4

Hazard Symbols: T

Risk Phrases: 45

**** SECTION 3 - HAZARDS IDENTIFICATION ****

EMERGENCY OVERVIEW

May cause cancer.Carcinogen.Mutagen.

Potential Health Effects

Eye:

May cause eye irritation.

Skin:

May cause skin irritation.

Ingestion:

May cause gastrointestinal irritation with nausea, vomiting and diarrhea.

Inhalation:

May cause respiratory tract irritation.

Chronic:

May cause cancer in humans. May cause cancer according to animal studies.

**** SECTION 4 - FIRST AID MEASURES ****

Eyes:

Immediately flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Get medical aid.

Skin:

Get medical aid. Immediately flush skin with plenty of soap and water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse.

Ingestion:

Do NOT induce vomiting. If victim is conscious and alert, give 2-4 cupfuls of milk or water. Never give anything by mouth to an unconscious person. Get medical aid immediately.

Inhalation:

Get medical aid immediately. Remove from exposure to fresh air immediately. If not breathing, give artificial respiration. If breathing is difficult, give oxygen.

Notes to Physician:

**** SECTION 5 - FIRE FIGHTING MEASURES ****

General Information:

As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. During a fire, irritating and highly toxic gases may be generated by thermal decomposition or combustion.

Extinguishing Media:

Use water spray, dry chemical, carbon dioxide, or chemical foam.

**** SECTION 6 - ACCIDENTAL RELEASE MEASURES ****

General Information: Use proper personal protective equipment as indicated in Section 8.

Spills/Leaks:

Vacuum or sweep up material and place into a suitable disposal container. Clean up spills immediately, observing precautions in the Protective Equipment section. Wear a self contained breathing apparatus and appropriate Personal protection. (See Exposure Controls, Personal Protection section). Provide ventilation.

**** SECTION 7 - HANDLING and STORAGE ****

Handling:

Wash thoroughly after handling. Wash hands before eating. Use only in a well-ventilated area. Do not breathe dust, vapor, mist, or gas. Do not get on skin or in eyes. Do not ingest or inhale.

Storage:

Store in a cool, dry place. Store in a tightly closed container. Store in a cool, dry area away from incompatible substances.

**** SECTION 8 - EXPOSURE CONTROLS, PERSONAL PROTECTION ****

Engineering Controls:

Use adequate general or local exhaust ventilation to keep airborne concentrations below the permissible exposure limits.

Personal Protective Equipment

Eyes:

Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.

Skin:

Wear appropriate protective gloves to prevent skin exposure.

Clothing:

Wear appropriate protective clothing to prevent skin exposure.

Respirators:

Follow the OSHA respirator regulations found in 29CFR 1910.134 or European Standard EN 149. Always use a NIOSH or European Standard EN 149 approved respirator when necessary.

**** SECTION 9 - PHYSICAL AND CHEMICAL PROPERTIES ****

Physical State:	Solid
Appearance:	very light beige
Odor:	Not available.
pH:	Not available.
Vapor Pressure:	Not available.
Vapor Density:	Not available.
Evaporation Rate:	Not available.
Viscosity:	Not available.
Boiling Point:	448 deg C @ 760.00mm Hg
Freezing/Melting Point:	254 - 255 deg C
Autoignition Temperature:	Not available.
Flash Point:	Not available.
Explosion Limits, lower:	Not available.
Explosion Limits, upper:	Not available.
Decomposition Temperature:	
Solubility:	insoluble

Specific Gravity/Density:
Molecular Formula: C18H12
Molecular Weight: 228.29

**** SECTION 10 - STABILITY AND REACTIVITY ****

Chemical Stability:
Stable under normal temperatures and pressures.
Conditions to Avoid:
Incompatible materials, dust generation.
Incompatibilities with Other Materials:
Strong oxidizing agents.
Hazardous Decomposition Products:
Carbon monoxide, carbon dioxide.
Hazardous Polymerization: Has not been reported.

**** SECTION 11 - TOXICOLOGICAL INFORMATION ****

RTECS#:
CAS# 218-01-9: GC0700000
LD50/LC50:
Not available.
Carcinogenicity:
Chrysene -
ACGIH: A3 - Animal Carcinogen
California: carcinogen; initial date 1/1/90
NIOSH: occupational carcinogen (listed as ** undefined **)
OSHA: Select carcinogen (listed as ** undefined **).
IARC: Group 3 carcinogen
Epidemiology:
No information available.
Teratogenicity:
No information available.
Reproductive Effects:
No information available.
Neurotoxicity:
No information available.
Mutagenicity:
Chrysene was mutagenic to *S. Typhimurium* in the presence of an exogenous metabolic system.
Other Studies:
Genotoxicity : *Salmonella typhimurium* TA97,TA98,TA100 with metabolic activation positive (Sakai.M.et al Mutat.Res1985); *Saccharomyces cerevisiae* (Miotic recombination) D3 strain 330mg/kg negative.

**** SECTION 12 - ECOLOGICAL INFORMATION ****

Ecotoxicity:
Water flea LC50 = 1.9 mg/L; 2 Hr.; UnspecifiedFish toxicity : LC50 (96hr) *Neaethes arenacedentata* >1ppm.(Rossi,S.S. et al Marine Pollut. Bull. 1978) Invertebrate toxicity : lethal treshold concentration (24hr) *Daphnia Magna* 0,75g/l.(* Newsted,J.L. et al Environ. Toxicol. Chem. 1987) Bioaccumulation : 24hr *Daphnia Magna* log bioconcentration factor 3.7845 (*)

**** SECTION 13 - DISPOSAL CONSIDERATIONS ****

Dispose of in a manner consistent with federal, state, and local regulations.

**** SECTION 14 - TRANSPORT INFORMATION ****

US DOT
No information available
Canadian TDG
No information available.

**** SECTION 15 - REGULATORY INFORMATION ****

US FEDERAL
TSCA

CAS# 218-01-9 is listed on the TSCA inventory.

This material does not contain any Class 2 Ozone depleters.

Clean Water Act:

None of the chemicals in this product are listed as Hazardous Substances under the CWA.

CAS# 218-01-9 is listed as a Priority Pollutant under the Clean Water Act.

None of the chemicals in this product are listed as Toxic Pollutants under the CWA.

OSHA:

None of the chemicals in this product are considered highly hazardous by OSHA.

STATE

Chrysene can be found on the following state right to know lists: California, New Jersey, Florida, Pennsylvania, Minnesota, Massachusetts.

The following statement(s) is(are) made in order to comply with the California Safe Drinking Water Act:

WARNING: This product contains Chrysene, a chemical known to the state of California to cause cancer.

California No Significant Risk Level:

None of the chemicals in this product are listed.

European/International Regulations

European Labeling in Accordance with EC Directives

Hazard Symbols: T

Risk Phrases:

R 45 May cause cancer.

Safety Phrases:

S 53 Avoid exposure - obtain special instructions before use.

S 45 In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).

WGK (Water Danger/Protection)

CAS# 218-01-9: No information available.

United Kingdom Occupational Exposure Limits

Canada

CAS# 218-01-9 is listed on Canada's DSL List.

CAS# 218-01-9 is listed on Canada's Ingredient Disclosure List.

Exposure Limits

CAS# 218-01-9: OEL-AUSTRALIA;Carcinogen

OEL-BELGIUM;Carcinogen

OEL-GERMANY;Carcinogen

OEL-SWITZERLAND;Carcinogen

OEL IN BULGARIA, COLOMBIA, JORDAN, KOREA check ACGIH TLV

OEL IN NEW ZEALAND, SINGAPORE, VIETNAM check ACGI TLV

**** SECTION 16 - ADDITIONAL INFORMATION ****

MSDS Creation Date: 6/30/1999 Revision #2 Date: 8/02/2000

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no way shall the company be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever arising, even if the company has been advised of the possibility of such damages.

HIGH-PURITY STANDARDS -- THALLIUM, 100058-1

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MSDS Safety Information

=====

FSC: 6810
MSDS Date: 02/05/1996
MSDS Num: CBXZR
LIIN: 00N072343
Product ID: THALLIUM, 100058-1
MFN: 01
Responsible Party
Cage: 0YZE5
Name: HIGH-PURITY STANDARDS
Box: 80609
City: CHARLESTON SC 29415-0609
Info Phone Number: 803-556-3411
Emergency Phone Number: 803-556-3411
Published: Y

=====

Contractor Summary

=====

Cage: 0YZE5
Name: HIGH-PURITY STANDARDS INC
Address: 2040 SAVAGE RD
Box: 30180
City: CHARLESTON SC 29417
Phone: 803-556-3411

=====

Ingredients

=====

Cas: 7440-28-0
RTECS #: XG3425000
Name: THALLIUM (SARA 313) (CERCLA)
% Wt: 0.1
OSHA PEL: S, 0.1 MG/M3
ACGIH TLV: S, 0.1 MG/M3
EPA Rpt Qty: 1000 LBS
DOT Rpt Qty: 1000 LBS

Cas: 7697-37-2
RTECS #: QU5775000
Name: NITRIC ACID; (HNO*3)
% Wt: 2
OSHA PEL: 2 PPM
ACGIH TLV: 2 PPM/4 STEL
EPA Rpt Qty: 1000 LBS
DOT Rpt Qty: 1000 LBS

=====

Health Hazards Data

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LD50 LC50 Mixture: NONE SPECIFIED BY MANUFACTURER.
Route Of Entry Inds - Inhalation: YES
Skin: YES
Ingestion: NO
Carcinogenicity Inds - NTP: NO
IARC: NO
OSHA: NO
Effects of Exposure: ACUTE:LIQUID MAY CAUSE BURNS TO SKIN AND EYES.
CHRONIC:NONE LISTED BY MANUFACTURER.
Explanation Of Carcinogenicity: NOT RELEVANT.
Signs And Symptions Of Overexposure: SEE HEALTH HAZARDS.
Medical Cond Aggravated By Exposure: NONE IDENTIFIED.
First Aid: INHAL:REMOVE TO FRESH AIR. SUPPORT BREATHING (GIVE O*2/ARTF RESP)

(FP N). INGEST:CALL A PHYSICIAN. IF SWALLOWED, DO NOT INDUCE VOMITING, IF CONSCIOUS GIVE WATER, MILK. EYES:FLUSH WITH PLENTY OF WATER FOR AT LEAST 15 MINUTES. SKIN:FLUSH WITH PLENTY OF WATER.

Handling and Disposal

Spill Release Procedures: REMOVE SOURCE OF IGNITION IF HYDROGEN IS A HAZARD. PROVIDE OPTIMUM VENTILATION. FLUSH TO HOLDING AREA FOR NEUTRALIZATION.
Neutralizing Agent: NONE SPECIFIED BY MANUFACTURER.
Waste Disposal Methods: FOLLOW FEDERAL, STATE AND LOCAL REGULATIONS FOR ACID WASTE. EPA HAZARDOUS WASTE #P113.
Handling And Storage Precautions: KEEP CONTAINER TIGHTLY CLOSED.
Other Precautions: NONE SPECIFIED BY MANUFACTURER.

Fire and Explosion Hazard Information

Extinguishing Media: USE APPROPRIATE.
Fire Fighting Procedures: USE NIOSH APPROVED SCBA & FULL PROTECTIVE EQUIPMENT (FP N).
Unusual Fire/Explosion Hazard: TOXIC GASES PRODUCED:NO, NO*2.

Control Measures

Respiratory Protection: NIOSH APPROVED RESPIRATOR.
Ventilation: LOCAL EXHAUST.
Protective Gloves: IMPERVIOUS GLOVES (FP N).
Eye Protection: ANSI APPRVD CHEM WORKERS GOGGS (SUPDAT)
Other Protective Equipment: LAB COAT/APRON; VENT HOOD. ANSI APPRVD EMERGENCY EYE WASH & DELUGE SHOWER (FP N).
Work Hygienic Practices: NONE SPECIFIED BY MANUFACTURER.
Supplemental Safety and Health: EYE PROT:& FULL LENGTH FACESHIELD (FP N).

Physical/Chemical Properties

B.P. Text: 212F,100C
Spec Gravity: 1.0122 (H*20=1)
Evaporation Rate & Reference: NOT KNOWN
Solubility in Water: COMPLETE
Appearance and Odor: CLEAR, COLORLESS ODORLESS SOLUTION.

Reactivity Data

Stability Indicator: YES
Stability Condition To Avoid: METALS, HYDROXIDES, CARBONATES, CYANIDES.
Materials To Avoid: STRONG REDUCING AGENTS.
Hazardous Decomposition Products: NO, NO*2 GAS.
Hazardous Polymerization Indicator: NO
Conditions To Avoid Polymerization: NOT RELEVANT.

Toxicological Information

Ecological Information

MSDS Transport Information

Regulatory Information

Other Information

HAZCOM Label

=====

Product ID: THALLIUM, 100058-1
Cage: 0YZE5
Company Name: HIGH-PURITY STANDARDS INC
Street: 2040 SAVAGE RD
PO Box: 30180
City: CHARLESTON SC
Zipcode: 29417
Health Emergency Phone: 803-556-3411
Label Required IND: Y
Date Of Label Review: 08/28/1996
Status Code: C
Label Date: 08/28/1996
Origination Code: G
Eye Protection IND: YES
Skin Protection IND: YES
Signal Word: DANGER
Respiratory Protection IND: YES
Health Hazard: Slight
Contact Hazard: Severe
Fire Hazard: None
Reactivity Hazard: None
Hazard And Precautions: CORROSIVE. ACUTE:LIQUID MAY CAUSE BURNS TO SKIN AND EYES. CHRONIC:NONE LISTED BY MANUFACTURER.

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**** SECTION 1 - CHEMICAL PRODUCT AND COMPANY IDENTIFICATION ****

MSDS Name: Manganese, powder, -325 mesh, 99+%

Catalog Numbers:

AC317440000, AC317442500

Synonyms:

Colloidal manganese; Mangacat

Company Identification (Europe): Acros Organics BVBA

Janssen Pharmaceuticaaan 3a

2440 Geel, Belgium

Company Identification (USA): Acros Organics

One Reagent Lane

Fairlawn, NJ 07410

For information in North America, call: 800-ACROS-01

For information in Europe, call: 0032(0) 14575211

For emergencies in the US, call CHEMTREC: 800-424-9300

For emergencies in Europe, call: 0032(0) 14575299

**** SECTION 2 - COMPOSITION, INFORMATION ON INGREDIENTS ****

CAS#	Chemical Name	%	EINECS#
7439-96-5	Manganese	99+%	231-105-1

Hazard Symbols: None Listed.

Risk Phrases: 10

**** SECTION 3 - HAZARDS IDENTIFICATION ****

EMERGENCY OVERVIEW

Flammable.Water-Reactive.

Potential Health Effects

Eye:

Causes eye irritation.

Skin:

Causes skin irritation.

Ingestion:

May cause irritation of the digestive tract.

Inhalation:

Causes respiratory tract irritation.

Chronic:

Substance may have carcinogenic potential. Chronic manganese toxicity through inhalation may result in "manganism", which is a disease of the central nervous system involving psychic and neurological disorders.

**** SECTION 4 - FIRST AID MEASURES ****

Eyes:

Immediately flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Get medical aid immediately.

Skin:

Get medical aid. Immediately flush skin with plenty of soap and water for at least 15 minutes while removing contaminated clothing and shoes.

Ingestion:

Do NOT induce vomiting. If victim is conscious and alert, give 2-4 cupfuls of milk or water. Never give anything by mouth to an unconscious person. Get medical aid immediately.

Inhalation:

Remove from exposure to fresh air immediately. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical aid.

Notes to Physician:

Treat symptomatically and supportively.

**** SECTION 5 - FIRE FIGHTING MEASURES ****

General Information:

As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. During a fire, irritating and highly toxic gases may be generated by thermal decomposition or combustion. Water Reactive.

Extinguishing Media:

DO NOT USE WATER! Use dry chemical.

**** SECTION 6 - ACCIDENTAL RELEASE MEASURES ****

General Information: Use proper personal protective equipment as indicated in Section 8.

Spills/Leaks:

Clean up spills immediately, observing precautions in the Protective Equipment section. Sweep up or absorb material, then place into a suitable clean, dry, closed container for disposal.

**** SECTION 7 - HANDLING and STORAGE ****

Handling:

Wash thoroughly after handling. Avoid contact with eyes, skin, and clothing. Avoid ingestion and inhalation. Use only in a chemical fume hood.

Storage:

Storage under a nitrogen blanket has been recommended.

**** SECTION 8 - EXPOSURE CONTROLS, PERSONAL PROTECTION ****

Engineering Controls:

Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower. Use only under a chemical fume hood.

Personal Protective Equipment

Eyes:

Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.

Skin:

Wear appropriate gloves to prevent skin exposure.

Clothing:

Wear appropriate clothing to prevent skin exposure.

Respirators:

Follow the OSHA respirator regulations found in 29CFR 1910.134 or European Standard EN 149. Always use a NIOSH or European Standard EN 149 approved respirator when necessary.

**** SECTION 9 - PHYSICAL AND CHEMICAL PROPERTIES ****

Physical State:	Powder
Appearance:	reddish-gray or silvery
Odor:	Not available.
pH:	Not available.
Vapor Pressure:	1 mm Hg @ 1292C
Vapor Density:	Not available.
Evaporation Rate:	Not available.
Viscosity:	Not available.
Boiling Point:	2060 deg C
Freezing/Melting Point:	1244 deg C
Autoignition Temperature:	Not available.
Flash Point:	Not available.
Explosion Limits, lower:	Not available.
Explosion Limits, upper:	Not available.
Decomposition Temperature:	
Solubility:	Reacts.

Specific Gravity/Density:
Molecular Formula: Mn
Molecular Weight: 54.94

**** SECTION 10 - STABILITY AND REACTIVITY ****

Chemical Stability:
Stable under normal temperatures and pressures.
Conditions to Avoid:
Incompatible materials, exposure to air, contact with water.
Incompatibilities with Other Materials:
Fluorine; chlorine + heat; hydrogen peroxide; brominepentafluoride;
sulfur dioxide + heat; nitrogen dioxide and oxidants.
Hazardous Decomposition Products:
No data available.
Hazardous Polymerization: Has not been reported

**** SECTION 11 - TOXICOLOGICAL INFORMATION ****

RTECS#:
CAS# 7439-96-5: 009275000
LD50/LC50:
CAS# 7439-96-5: Draize test, rabbit, eye: 500 mg/24H Mild; Draize
test, rabbit, skin: 500 mg/24H Mild; Oral, rat: LD50 = 9 gm/kg.
Carcinogenicity:
Manganese -
Not listed by ACGIH, IARC, NIOSH, NTP, or OSHA.
Epidemiology:
No data available.
Teratogenicity:
No data available.
Reproductive Effects:
No data available.
Neurotoxicity:
No data available.
Mutagenicity:
No data available.
Other Studies:
No data available.

**** SECTION 12 - ECOLOGICAL INFORMATION ****

**** SECTION 13 - DISPOSAL CONSIDERATIONS ****

Dispose of in a manner consistent with federal, state, and local regulations.

**** SECTION 14 - TRANSPORT INFORMATION ****

US DOT
Shipping Name: METAL POWDERS, FLAMMABLE, N.O.S.
(MANGANESE POWDER)
Hazard Class: 4.1
UN Number: UN3089
Packing Group: III
Canadian TDG
No information available.

**** SECTION 15 - REGULATORY INFORMATION ****

US FEDERAL
TSCA

CAS# 7439-96-5 is listed on the TSCA inventory.
This material does not contain any Class 2 Ozone depletors.
Clean Water Act:
None of the chemicals in this product are listed as Hazardous
Substances under the CWA.
None of the chemicals in this product are listed as Priority
Pollutants under the CWA.

None of the chemicals in this product are listed as Toxic Pollutants under the CWA.

OSHA:

None of the chemicals in this product are considered highly hazardous by OSHA.

STATE

Manganese can be found on the following state right to know lists:
California, New Jersey, Florida, Pennsylvania, Minnesota,
Massachusetts.

California No Significant Risk Level:

None of the chemicals in this product are listed.

European/International Regulations

European Labeling in Accordance with EC Directives

Hazard Symbols: Not available.

Risk Phrases:

R 10 Flammable.

Safety Phrases:

S 8 Keep container dry.

S 36/37/39 Wear suitable protective clothing, gloves
and eye/face protection.

WGK (Water Danger/Protection)

CAS# 7439-96-5: No information available.

United Kingdom Occupational Exposure Limits

CAS# 7439-96-5: OES-United Kingdom, TWA fume, as Mn: 1 mg/m3 TWA;
metal, as Mn: 5 mg/m3 TWA

CAS# 7439-96-5: OES-United Kingdom, STEL fume, as Mn: 3 mg/m3 STEL

Canada

CAS# 7439-96-5 is listed on Canada's DSL List.

CAS# 7439-96-5 is listed on Canada's Ingredient Disclosure List.

Exposure Limits

CAS# 7439-96-5: OEL-ARAB Republic of Egypt:TWA 5 mg/m3

OEL-AUSTRALIA:TWA 1 mg/m3;STEL 3 mg/m3 (fume)

OEL-BELGIUM:TWA 1 mg/m3;STEL 3 mg/m3 (fume)

OEL-DENMARK:TWA 1 mg/m3 (fume)

OEL-DENMARK:TWA 2.5 mg/m3

OEL-FINLAND:TWA 1 mg/m3 (fume)

OEL-FINLAND:TWA 2.5 mg/m3

OEL-FRANCE:TWA 1 mg/m3 (fume)

OEL-GERMANY:TWA 5 mg/m3

OEL-THE PHILIPPINES:TWA 5 mg/m3

OEL-RUSSIA:STEL 0.2 mg/m3 (fume)

OEL-SWEDEN:TWA 2.5 mg/m3

OEL-SWITZERLAND:TWA 1 mg/m3 (fume)

OEL-SWITZERLAND:TWA 5 mg/m3

OEL-THAILAND:TWA 5 mg/m3

OEL-TURKEY:TWA 5 mg/m3 (fume)

OEL-UNITED KINGDOM:TWA 1 mg/m3;STEL 3 mg/m3

OEL IN BULGARIA, COLOMBIA, JORDAN, KOREA check ACGIH TLV

OEL IN NEW ZEALAND, SINGAPORE, VIETNAM check ACGI TLV

**** SECTION 16 - ADDITIONAL INFORMATION ****

MSDS Creation Date: 3/16/1998 Revision #1 Date: 8/02/2000

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no way shall the company be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever arising, even if the company has been advised of the possibility of such damages.

SUPELCO INC -- PCB-A-20 ISOCTANE 1ML, AROCLOR 1254

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MSDS Safety Information

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FSC: 6630
 MSDS Date: 05/25/1994
 MSDS Num: CFLPX
 LIIN: 00N043338
 Product ID: PCB-A-20 ISOCTANE 1ML, AROCLOR 1254
 MFN: 10
 Kit Part: Y
 Responsible Party
 Cage: 54968
 Name: SUPELCO INC
 Address: SUPELCO PARK
 City: BELLEFONTE PA 16823-0048
 Info Phone Number: 814-359-3441
 Emergency Phone Number: 814-359-3441
 Published: Y

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Contractor Summary

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Cage: 54968
 Name: SUPELCO INC
 Address: SUPELCO PARK
 City: BELLEFONTE PA 16823-0048
 Phone: 814-359-3441

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Ingredients

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Cas: 11097-69-1
 RTECS #: TQ1360000
 Name: POLYCHLORINATED BIPHENYL (AROCLOR 1254); (AROCHLOR 1254) (SARA 313)
 (CERCLA). LD50:(ORAL,RAT) 4470 MG/KG
 % Wt: 0.0001
 OSHA PEL: N/K (FP N)
 ACGIH TLV: N/K (FP N)
 EPA Rpt Qty: 1 LB
 DOT Rpt Qty: 1 LB

Cas: 540-81-1
 RTECS #: SA3320000
 Name: PENTANE, 1,2,4-TRIMETHYL-; (ISO-OCTANE) (CERCLA)
 % Wt: 100
 OSHA PEL: N/K (FP N)
 ACGIH TLV: N/K (FP N)

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Health Hazards Data

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LD50 LC50 Mixture: SEE INGREDIENT 1
 Route Of Entry Inds - Inhalation: YES
 Skin: YES
 Ingestion: YES
 Carcinogenicity Inds - NTP: NO
 IARC: NO
 OSHA: NO
 Effects of Exposure: ACUTE: CONTAINS LOW CONCENTRATION(S) OF MATERIAL(S) KNOWN
 TO THE STATE OF CALIFORNIA TO CAUSE CANCER. SUCH CONCENTRATION(S) IS/ARE
 SUBSTANTIALLY BELOW OSHA-HCS THRESHOLDS WHICH WOULD REQUIRE LISTING HEREIN AS
 A COMPONENT OF THIS MIXTURE. HU MAN SUSPECT - CARCINOGEN.
 Explanation Of Carcinogenicity: NOT RELEVANT.
 Signs And Symptoms Of Overexposure: SEE HEALTH HAZARDS.
 Medical Cond Aggravated By Exposure: NONE SPECIFIED BY MANUFACTURER.

First Aid: EYES: FLUSH WITH WATER FOR AT LEAST 15 MINUTES. SKIN: FLUSH WITH LARGE VOLUMES OF WATER. INHAL: IMMEDIATELY MOVE TO FRESH AIR. GIVE OXYGEN IF BREATHING IS LABORED. IF BREATHING STOPS, GIVE ARTIFICIAL RESPIRATION. INGEST: NEVER GIVE ANYTHING BY MOUTH TO UNCONSCIOUS PERSON. NEVER TRY TO MAKE AN UNCONSCIOUS PERSON VOMIT. DO NOT INDUCE VOMITING.

Handling and Disposal

Spill Release Procedures: TAKE UP WITH ABSORBENT MATERIAL. VENTILATE AREA.

Neutralizing Agent: NONE SPECIFIED BY MANUFACTURER.

Waste Disposal Methods: COMPLY WITH ALL APPLICABLE FEDERAL, STATE, OR LOCAL REGULATIONS.

Handling And Storage Precautions: STORE IN SEALED CONTAINER IN COOL, DRY LOCATION. KEEP AWAY FROM HEAT. STORE IN DRY, WELL VENTILATED AREA. KEEP AWAY FROM IGNITION SOURCES.

Other Precautions: AVOID EYE/SKIN CONT. AVOID BREATHING VAPS. THIS MATL IS INTENDED FOR R&D USE ONLY & MAY NOT BE USED FOR DRUG, HOUSEHOLD/OTHER PURPOSES. IT IS SUBJECT TO TSCA REGS @ CFR 40 PART 720.36 WHICH DEAL W/ EXEMPTION OF CHEMS USED IN RESEARCH (SUPDAT)

Fire and Explosion Hazard Information

Flash Point Method: CC

Flash Point Text: 10F, -12C

Lower Limits: 1.1%

Upper Limits: 6.0%

Extinguishing Media: FOAM, DRY CHEMICAL.

Fire Fighting Procedures: USE NIOSH APPROVED SCBA & FULL PROTECTIVE EQUIPMENT (FP N).

Unusual Fire/Explosion Hazard: CAN REACT VIGOROUSLY WITH REDUCING MATERIALS.

Control Measures

Respiratory Protection: NIOSH APPROVED FACE MASK WITH ORGANIC VAPOR CANISTER.

Ventilation: USE ONLY IN WELL VENTILATED AREA.

Protective Gloves: IMPERVIOUS GLOVES (FP N).

Eye Protection: ANSI APPRVD CHEM WORKERS GOGGLES (FP N).

Other Protective Equipment: ANSI APPRVD EYE WASH & DELUGE SHOWER (FP N).

Work Hygienic Practices: NONE SPECIFIED BY MANUFACTURER.

Supplemental Safety and Health: OTHER PREC: & DEVELOPMENT FROM PMN (PREMANUFACTURE NOTIFICATION) REQUIREMENTS. IN ADDITION, BURDEN OF SAFE USE OF MATL RESTS W/YOU &, THEREFORE, IT SHOULD BE HANDLED ONLY BY QUALIFIED PERSONS TRAINED IN LABORATORY PROCEDURES AND GOOD SAFETY PRACTICES.

Physical/Chemical Properties

B.P. Text: 210F, 99C

M.P/F.P Text: -177F, -116C

Vapor Pres: 41

Vapor Density: 3.90

Spec Gravity: 0.690 (H*20=1)

Evaporation Rate & Reference: >1 (ETHER =1)

Appearance and Odor: CLEAR COLORLESS LIQUID.

Percent Volatiles by Volume: 100

Reactivity Data

Stability Indicator: YES

Materials To Avoid: REDUCING AGENTS.

Hazardous Polymerization Indicator: NO

Conditions To Avoid Polymerization: NOT RELEVANT.

Toxicological Information

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Ecological Information

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MSDS Transport Information

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Regulatory Information

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Other Information

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HAZCOM Label

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Product ID: PCB-A-20 ISOCTANE 1ML, AROCLOR 1254

Cage: 54968

Company Name: SUPELCO INC

Street: SUPELCO PARK

City: BELLEFONTE PA

Zipcode: 16823-0048

Health Emergency Phone: 814-359-3441

Label Required IND: Y

Date Of Label Review: 10/14/1997

Status Code: C

Label Date: 10/14/1997

Origination Code: G

Chronic Hazard IND: Y

Eye Protection IND: YES

Skin Protection IND: YES

Signal Word: DANGER

Respiratory Protection IND: YES

Health Hazard: Slight

Contact Hazard: Slight

Fire Hazard: Severe

Reactivity Hazard: None

Hazard And Precautions: ACUTE/CHRONIC: CONTAINS LOW CONCENTRATION(S) OF
MATERIAL(S) KNOWN TO CAUSE CANCER.

=====

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MSDS**Material Safety Data Sheet**

From: Mallinckrodt Baker, Inc.
222 Red School Lane
Phillipsburg, NJ 08865



24 Hour Emergency Telephone: 800-659-2151
CHEMTREC: 1-800-424-9300

National Response in Canada
CANUTEC: 613-666-6666

Outside U.S. and Canada
Chemtrec: 703-627-3667

NOTE: CHEMTREC, CANUTEC and National Response Center emergency numbers to be used only in the event of chemical emergencies involving a spill, leak, fire, exposure or accident involving chemicals.

All non-emergency questions should be directed to Customer Service (1-800-582-2537) for assistance.

IRON

MSDS Number: I7500 --- Effective Date: 12/18/00

1. Product Identification

Synonyms: Metallic Iron; Elemental Iron.

CAS No.: 7439-89-6

Molecular Weight: 55.85

Chemical Formula: Fe

Product Codes: 2234

2. Composition/Information on Ingredients

Ingredient	CAS No	Percent	Hazardous
Iron Reduced	7439-89-6	90 - 100%	Yes

3. Hazards Identification**Emergency Overview**

CAUTION! MAY BE HARMFUL IF SWALLOWED OR INHALED. MAY CAUSE IRRITATION TO EYES AND RESPIRATORY TRACT.

J.T. Baker SAF-T-DATA^(tm) Ratings (Provided here for your convenience)

Health Rating: 1 - Slight

Flammability Rating: 0 - None
Reactivity Rating: 1 - Slight
Contact Rating: 0 - None
Lab Protective Equip: GOGGLES; LAB COAT
Storage Color Code: Orange (General Storage)

Potential Health Effects

Inhalation:

May cause irritation to the respiratory tract. Symptoms may include coughing and shortness of breath.

Ingestion:

Extremely large oral dosages may produce gastrointestinal disturbances. An overdose of iron may cause vomiting, abdominal pain, bloody diarrhea, vomiting blood, lethargy, and shock. In severe cases, toxicity may progress and develop into an increase in acidity in the blood, bluish skin discoloration, fever, liver damage, and possibly death.

Skin Contact:

No adverse effects expected.

Eye Contact:

May cause irritation, redness and pain. Eye contact may cause conjunctivitis and deposition of iron particles can leave a "rust ring" or brownish stain on the cornea.

Chronic Exposure:

Long-term inhalation exposure to iron has resulted in mottling of the lungs, a condition referred to as siderosis. This is considered a benign pneumoconiosis and does not ordinarily cause significant physiological impairment. Ingestion of greater than 50 to 100 mg of iron per day may result in pathological iron deposition in body tissues. Repeated iron ingestion can produce cardiac toxicity.

Aggravation of Pre-existing Conditions:

Persons with impaired respiratory function may be more susceptible to the effects of the substance.

4. First Aid Measures

Inhalation:

Remove to fresh air. Get medical attention for any breathing difficulty.

Ingestion:

Induce vomiting immediately as directed by medical personnel. Never give anything by mouth to an unconscious person. Get medical attention.

Skin Contact:

Wash exposed area with soap and water. Get medical advice if irritation develops.

Eye Contact:

Immediately flush eyes with plenty of water for at least 15 minutes, lifting upper and lower eyelids occasionally. Get medical attention if irritation persists.

5. Fire Fighting Measures

Fire:

Moderate fire hazard in form of dust when exposed to heat or flame. Can react with water to liberate flammable hydrogen gas. Minimum ignition temperature, iron dust cloud: 430C (805F). Ultrafine iron powder (ca. 5 microns) is pyrophoric and can ignite spontaneously in air.

Explosion:

Moderate explosion hazard in the form of a dust when exposed to heat or flame.

Fire Extinguishing Media:

Use powdered graphite, powdered salt, or powdered limestone. DO NOT use water, carbon dioxide, or dry chemical.

Special Information:

In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode.

6. Accidental Release Measures

Ventilate area of leak or spill. Wear appropriate personal protective equipment as specified in Section 8. Spills: Pick up and place in a suitable container for reclamation or disposal, using a method that does not generate dust.

7. Handling and Storage

Keep in a tightly closed container, stored in a cool, dry, ventilated area. Protect against physical damage. Avoid dust formation and control ignition sources. Containers of this material may be hazardous when empty since they retain product residues (dust, solids); observe all warnings and precautions listed for the product.

8. Exposure Controls/Personal Protection

Airborne Exposure Limits:

- OSHA Permissible Exposure Limit (PEL) -

Iron oxide fume: 10 mg/m³

- ACGIH Threshold Limit Value (TLV) -

Iron oxide dust and fume (Fe₂O₃) as Fe: 5 mg/m³ (TWA); inhalable particulate: A4 -

Not classifiable as a human carcinogen.

Ventilation System:

A system of local and/or general exhaust is recommended to keep employee exposures below the Airborne Exposure Limits. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing

dispersion of it into the general work area. Please refer to the ACGIH document, *Industrial Ventilation, A Manual of Recommended Practices*, most recent edition, for details.

Personal Respirators (NIOSH Approved):

If the exposure limit is exceeded, a full facepiece respirator with dust/mist filter may be worn up to 50 times the exposure limit or the maximum use concentration specified by the appropriate regulatory agency or respirator supplier, whichever is lowest. For emergencies or instances where the exposure levels are not known, use a full-facepiece positive-pressure, air-supplied respirator. **WARNING:** Air purifying respirators do not protect workers in oxygen-deficient atmospheres.

Skin Protection:

Wear protective gloves and clean body-covering clothing.

Eye Protection:

Maintain eye wash fountain and quick-drench facilities in work area. Use chemical safety goggles and/or full face shield where dusting or splashing of solutions is possible.

9. Physical and Chemical Properties

Appearance:

Gray crystalline chips.

Odor:

No information found.

Solubility:

Insoluble, can react with water.

Specific Gravity:

7.86 @ 20C (68F)

pH:

No information found.

% Volatiles by volume @ 21C (70F):

0

Boiling Point:

2750C (4982F)

Melting Point:

1535C (2795F)

Vapor Density (Air=1):

Not applicable.

Vapor Pressure (mm Hg):

1 @ 1787C (3249F)

Evaporation Rate (BuAc=1):

No information found.

10. Stability and Reactivity

Stability:

Stable in dry air but readily oxidizes in moist air forming rust. Ultrafine (ca. 5 microns) powder forms are very unstable and can ignite spontaneously in air.

Hazardous Decomposition Products:

May produce toxic iron oxide fumes when heated to decomposition.

Hazardous Polymerization:

Will not occur.

Incompatibilities:

Strong oxidizers, water (including humid atmospheres), acids, hydrogen peroxide, nitrogen dioxide. Solid or powdered iron ignites or explodes on contact with acetaldehyde, ammonium peroxodisulfate, chloroformamidinium, chloric acid, ammonium nitrate, halogens, dinitrogen tetroxide, nitryl fluoride, polystyrene, sodium acetylide, potassium dichromate, peroxyformic acid, and nitryl fluoride. Hot iron wire burns in chlorine gas. Chlorine trifluoride reacts with iron with incandescence.

Conditions to Avoid:

Heat, flame, ignition sources, dusting and incompatibles.

11. Toxicological Information

Oral rat LD50: 30 gm/kg; investigated as a tumorigen.

-----\Cancer Lists\-----			
Ingredient	---NTP Carcinogen---		IARC Category
	Known	Anticipated	

Iron Reduced (7439-89-6)	No	No	None

12. Ecological Information

Environmental Fate:

No information found.

Environmental Toxicity:

No information found.

13. Disposal Considerations

Whatever cannot be saved for recovery or recycling should be managed in an appropriate and approved waste facility. Although not a listed RCRA hazardous waste, this material may exhibit one or more characteristics of a hazardous waste and require appropriate analysis to determine specific disposal requirements. Processing, use or contamination of this product may change the waste management options. State and local disposal regulations may differ from federal disposal regulations. Dispose of container and unused contents in accordance with federal, state and local requirements.

14. Transport Information

Not regulated.

15. Regulatory Information

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-----\Chemical Inventory Status - Part 1\-----
Ingredient                                     TSCA  EC   Japan  Australia
-----
Iron Reduced (7439-89-6)                       Yes  Yes   No     Yes
  
```

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-----\Chemical Inventory Status - Part 2\-----
Ingredient                                     Korea  --Canada--
                                           DSL    NDSL   Phil.
-----
Iron Reduced (7439-89-6)                       Yes   Yes    No     Yes
  
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-----\Federal, State & International Regulations - Part 1\-----
Ingredient                                     -SARA 302-  -SARA 313-
                                           RQ    TPQ    List  Chemical Catg.
-----
Iron Reduced (7439-89-6)                       No    No     No     No
  
```

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-----\Federal, State & International Regulations - Part 2\-----
Ingredient                                     CERCLA  -RCRA-  -TSCA-
                                           261.33  8(d)
-----
Iron Reduced (7439-89-6)                       No      No      No
  
```

Chemical Weapons Convention: No TSCA 12(b): No CDTA: No
 SARA 311/312: Acute: Yes Chronic: Yes Fire: No Pressure: No
 Reactivity: No (Pure / Solid)

Australian Hazchem Code: No information found.

Poison Schedule: No information found.

WHMIS:

This MSDS has been prepared according to the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR.

16. Other Information

NFPA Ratings: Health: 3 Flammability: 1 Reactivity: 1

Label Hazard Warning:

CAUTION! MAY BE HARMFUL IF SWALLOWED OR INHALED. MAY CAUSE IRRITATION TO EYES AND RESPIRATORY TRACT.

Label Precautions:

Avoid contact with eyes, skin and clothing.

Wash thoroughly after handling.

Avoid breathing dust.

Keep container closed.

Use with adequate ventilation.

Label First Aid:

If swallowed, induce vomiting immediately as directed by medical personnel. Never give anything by mouth to an unconscious person. If inhaled, remove to fresh air. Get medical attention for any breathing difficulty. In case of eye contact, immediately flush eyes with plenty of water for at least 15 minutes. Get medical attention if irritation develops or persists.

Product Use:

Laboratory Reagent.

Revision Information:

No changes.

Disclaimer:

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